



Pacific Horticultural and Agricultural Market Access Program (PHAMA)

Feasibility Study On Selected Horticultural Exports
From Fiji To Australia

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Abbreviations

Abbreviation	Description
ACIAR	Australian Centre for International Agricultural Research
AQIS	Australian Quarantine and Inspection Service
AUD	Australian dollars
BAF	Biosecurity Authority of Fiji
BNE	Brisbane
BQA	Bilateral Quarantine Arrangement
DOA	Department of Agriculture
DPI	Department of Primary Industry
EDB	Ethylene dibromide
FJD	Fiji dollars
FOB	Free on board
GDP	Gross domestic product
HTFA	High Temperature Forced-Air
ICON	Import Conditions
MAWG	Market Access Working Group
MEL	Melbourne
MPI	Ministry of Primary Industries
NMAC	National Market Access Coordinator
NWC	Nature's Way Cooperative
PHAMA	Pacific Horticultural and Agricultural Market Access Program
PIC	Pacific island country
R&D	Research and development
SPC	Secretariat of the Pacific Community
SPS	Sanitary and phytosanitary
SYD	Sydney
URS	URS Australia Pty Ltd
USA	United States of America
USAID	United States Agency for International Development
USDA	United States Department of Agriculture

Exchange Rates

Fiji Dollars (FJD) 1.00 = AUD 0.53

Australian Dollars (AUD) 1.00 = FJD 1.87

Executive Summary

Background: The Fiji Market Access Working Group (MAWG) requested that the Pacific Horticultural and Agricultural Market Access Program (PHAMA) conduct preliminary export feasibility studies for six horticultural products to determine whether there is merit in pursuing formal market access arrangements for the Australian market. A study was undertaken during January–February 2012 in Fiji and Australia to assess the commercial prospects for the six commodities identified by the Fiji MAWG. During the course of the study, okra was identified as having significant promise, so the list was expanded to seven products, as follows:

- Breadfruit
- Jackfruit
- Pineapple
- Chilli
- Eggplant
- Bitter Gourd
- Okra.

Fiji lodged market access requests for most of these products some time ago, but the necessary risk analysis work has not yet been initiated by Biosecurity Australia, and the requests have been categorised as “out of date” or “lower priority” by the Australian authorities as part of a recent review of all market access requests. The feasibility study is intended to identify products from this list which have good prospects of commercial success as the basis for selecting one or two products for which market access requests can be initiated.

Rationale: Fiji and other Pacific island countries (PICs) have been successful in developing export markets for horticultural products in New Zealand, but generally less successful in penetrating the much larger Australian market. New Zealand market access is facilitated by a well-developed Bilateral Quarantine Agreement (BQA), better sea freight linkages, and a strong presence of Pacific Islander and Indo-Fijian people in the New Zealand market who have a preference for some traditional products from the Pacific Islands. Conversely, access to the Australian market is constrained by the absence of established import regulations except for a few commodities (e.g. taro, pawpaw, okra), longer shipping times, limited air freight capacity, high quarantine inspection and clearance costs, competitive domestic supplies of tropical commodities, and the aversion of Australian consumers to imported horticultural products. Australia is unique in its high levels of quarantine protection and consumer aversion to imported produce, which mean that imported items will only sell if the local equivalent is in short supply, such as for taro and pawpaws, or if the imported product is significantly cheaper (e.g. garlic from China). All of these factors combine to make the Australian market difficult to penetrate and highlight the need to be very careful in selecting commodities for development of marketing pathways.

However, it is also recognised that Eastern Australia is a large market compared to New Zealand, with almost 11 million people in the three eastern capitals, a high degree of cultural and culinary diversity, a strong exchange rate relative to the Fiji dollar (and most other currencies), and high domestic food prices. Moreover, experience with the development of air freight exports of pawpaws to Australia, and the sea freight trade in taro, demonstrates that well-selected niche markets can be profitably accessed. In addition, Fiji has developed considerable capacity in its fresh produce export sector

through a dozen or so well established export businesses and the High Temperature Forced-Air (HTFA) facility.

Agricultural sector background: Fiji's agricultural sector is generally considered in three parts: sugar, non-sugar commercial, and subsistence. The sugar sub-sector has struggled in recent years due to the loss of preferential access to the European Union market, the expiry of many of the long-term leases for sugar lands, and the financial difficulties of the Fiji Sugar Corporation. The non-sugar commercial sub-sector is where horticultural export crops are mainly grown, and has shown improvement in performance over the last decade with the development of export market outlets, mainly to New Zealand, as well as the growth of the domestic market. The subsistence sub-sector is the basis of livelihood for about a third of the population and mainly focuses on traditional fruits, vegetables and root crops, with some produce entering domestic market channels, but very little being exported.

Supply issues: Information on the production of **breadfruit** is limited and there is no information on **jackfruit** production. Both of these items are produced informally from backyard and scattered trees, with surpluses to household needs finding their way into local and occasionally export markets. **Pineapple** production has shown a steady uptrend over the last decade, but has the potential to expand much further if export markets can be developed. Currently, almost all pineapples are sold on the domestic market. **Chilli** production appears to be trending downwards, but is adequate to supply the export market in New Zealand. **Eggplant** production fluctuates between 1,000 and 1,400 tonnes per annum (but was much lower in 2011) and supplies both domestic and New Zealand export markets. There is no information on production of **bitter gourd**, but this is assumed to be very low because little is seen in the local markets. Production of **okra** appears to be declining, but exports are gaining an increased share of the market.

Export of horticultural produce: The report shows the volume of exports for each of the seven commodities by destination. For the principal export commodities (chilli, eggplant and okra), New Zealand was the destination of between 94% and 97% of exports. Australia is only a significant destination for pawpaw, for which it accounted for a third of exports over the period. New Zealand was also the major customer for pawpaw, taking 57% of pawpaw exports. However, Australia's imports of Fiji pawpaws have been increasing in the last five years, again demonstrating what can happen once export pathways are opened up.

The domestic market: An export marketing strategy for any horticultural product must also consider the requirements of the domestic market, which remains an important outlet for most of the products which are exported or potentially exported to Australia and other destinations. Most of the locally traded produce goes through the urban retail markets, although there are increasing sales through supermarkets and to tourist hotels and restaurants. Tourist arrivals are now about equal in number to Fiji's resident population; however, with an average stay of ten days, demand for food from the tourism sector only adds about 3% to domestic demand. The tourism market presents similar demands to the export market in terms of quality, presentation, packaging, food safety and reliability of supply, but does not face the same quarantine and transport barriers.

The Australian market for horticultural products is by far the largest in the region, with more than 22 million relatively affluent consumers. However, domestic production supplies almost all of that market year round. This is unique among developed countries, most of which source fresh produce supplies from around the world, depending on prices and availability. There are a number of reasons why

Australia exhibits such a high degree of self-sufficiency in its horticultural produce markets, all of which need to be considered by PICs in formulating market access strategies:

- Australia has a high degree of agro-ecological diversity, ranging from tropical to cool temperate. Supplies of many products are maintained year round, from the tropical areas in winter and the temperate areas in summer.
- There are high levels of quarantine protection, ranging from total import bans for some items (e.g. bananas) to strict procedures and protocols for others. No item can be imported unless there are established country-specific and product-specific protocols.
- Compliance with import protocols incurs significant inspection and clearance fees charged by the Australian Quarantine Inspection Service (AQIS), and the time taken to inspect consignments adds to transit times¹.
- Food retailers, particularly the large supermarket chains, are increasingly concerned about food safety and require their suppliers to employ formal food safety risk mitigation and traceability measures. The supermarkets also employ “ethical sourcing” protocols that require all suppliers to be independently audited with regard to meeting social and environmental standards.
- Australian consumers are accustomed to obtaining the bulk of their food supplies from Australian sources and are strongly averse to buying imported produce. The reasons for this are unclear, especially since so many Australians are recent immigrants. However, retailers report that imported produce is very difficult to sell unless local supplies are limited or not available or the imported alternative is significantly cheaper.

These five factors combine to make the Australian market difficult and expensive to access. However, there are positive influences as well. Firstly, Australia has a high degree of ethnic and culinary diversity, which creates niche markets for a number of speciality foods that may not be of particular interest to mainstream consumers. Secondly, Australian food prices have become very expensive in recent years relative to other developed countries such as Europe and the United States. This trend has been accentuated by the strengthening of the Australian dollar against most other currencies, which makes imported items more competitive in the Australian market.

Target market sectors: In terms of **geographic** target, the three eastern seaboard cities (Brisbane, Sydney and Melbourne) present the most attractive and accessible sectors. These have a combined population of 11 million, which is 50% of the national total, or perhaps 65% if nearby cities are included. All of the main cities have direct scheduled flights from Fiji and a regular container shipping service (Fiji–Auckland–Melbourne–Sydney–Brisbane).

The most accessible market entry point is via the **wholesale markets** in each capital city. These are all large and well-managed wholesale markets which supply the retail sector as well as food service and institutional customers. The operators in these markets include agents who sell on commission, as well as buyers and distributors for retail and other customers. Some of the supermarkets source supplies through the wholesale markets, whereas others have contracts with direct suppliers. Supply chains are often defined along ethnic lines, with middle-eastern market operatives supplying middle-eastern greengrocers, Chinese supplying Asian grocers, etc. Fiji exporters will generally find it easier to work with agents who are well connected to the ethnic supply chains rather than those who supply the supermarkets and up-market/boutique greengrocers, where food safety, traceability and “ethical sourcing” procedures can be onerous.

¹ Some major exporting countries (e.g. the United States) have arranged pre-clearance procedures whereby AQIS inspects and clears consignments before they are shipped. This creates cost savings and reduces clearance times after arrival in Australia.

Conclusions and recommendations: Considering all of the supply and demand-related issues for the seven candidate commodities, the findings of the study clearly point towards **chilli as the highest priority** for development of Australian market access protocols. Chilli is a high value fresh produce commodity and Fiji has good prospects of establishing a profitable market presence with the existing main varieties grown. While the volumes will not be large, initially at least, chilli exports represent a very efficient use of the available air freight capacity. Even if chilli exports displace existing lower value air cargo commodities, this would still be an overall net gain to the sector. Further expansion of the chilli-growing industry also provides opportunities for value-added processing of chilli products such as dried chillies, chilli powder, chilli sauces, and possibly industrial applications like capsicum spray used for personal defence. Potential also exists for sea freight in the longer term, including to more distant markets such as Canada and Japan.

Pineapples are considered second priority as a potential high volume/low margin export commodity. However, the development of Australian market access need not be fast tracked because the development of the New Zealand market will be given priority by exporters. New Zealand represents an easier target market in the first instance because of shorter shipping times, lower shipping costs and less competition from domestic suppliers.

There are **immediate opportunities to begin exporting okra** to Australia under the existing market access arrangements, preferably targeting the winter-spring window of opportunity.

The other four commodities considered all face significant barriers to commercial success and do not justify investment in developing Australian market access.

1 Introduction

1.1 Background

The Pacific Horticultural and Agricultural Market Access Program (PHAMA) is an aid-for-trade program financed by the Australian Government through AusAID, which aims to increase exports of high value primary products from Pacific island countries (PICs) by working collaboratively with relevant government agencies and export industries to address regulatory aspects associated with gaining and maintaining access to key markets. This reflects the generally poor export performance of PICs during an era of strong growth in global trade, and Australia's very low level of horticultural and agricultural imports from the Pacific. PHAMA's major focus areas include:

- Assisting with the identification of high priority market access issues and opportunities, and with the preparation and processing of market access submissions;
- Assisting with the implementation of sanitary and phytosanitary (SPS) measures required to maintain market access, once gained;
- Assisting with the research and development required to underpin market access activities; and
- Supporting the Secretariat of the Pacific Community (SPC) to develop higher level regional market access support services.

Each of the PHAMA participating countries (Fiji, Samoa, Solomon Islands, Tonga and Vanuatu) has a Market Access Working Group (MAWG) and a National Market Access Coordinator (NMAC). The MAWGs are responsible for prioritising the market access activities for PHAMA support, and for overseeing implementation of these activities. The Fiji MAWG requested that PHAMA conduct preliminary export feasibility studies for six horticultural products to determine whether there is merit in pursuing formal market access arrangements for the Australian market. A study was undertaken during January–February 2012 in Fiji and Australia to assess the commercial prospects for the six commodities identified by the Fiji MAWG. During the course of the study, okra was identified as having significant promise, so the list was expanded to seven products, as follows:

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Fiji lodged market access requests for most of these products some time ago, but the necessary risk analysis work has not yet been initiated by Biosecurity Australia, and the requests have been categorised as “out of date” or “lower priority” by the Australian authorities as part of a recent review of all market access requests. The feasibility study is intended to identify products from this list which have good prospects of commercial success as the basis for selecting one or two products for which market access requests can be initiated. This screening and prioritisation process reflects the significant resources required to undertake a full biosecurity risk assessment and develop the necessary market access protocols. The time required to complete this work ranges from two to three years for a single product, depending on whether that product has already been assessed for importation from other sources.

1.2 Rationale

Fiji and other PICs have been successful in developing export markets for horticultural products in New Zealand, but generally less successful in penetrating the much larger Australian market. New Zealand market access is facilitated by a well-developed Bilateral Quarantine Agreement (BQA), better sea freight linkages, and a strong presence of Pacific Islander and Indo-Fijian people in the New Zealand market who have a preference for some traditional products from the Pacific Islands. Conversely, access to the Australian market is constrained by the absence of established import regulations except for a few commodities (e.g. taro, pawpaw, okra), longer shipping times, limited air freight capacity, high quarantine inspection and clearance costs, competitive domestic supplies of tropical commodities, and the aversion of Australian consumers to imported horticultural products. Australia is unique in its high levels of quarantine protection and consumer aversion to imported produce, which means that imported items will only sell if the local equivalent is in short supply, such as for taro and pawpaws, or if the imported product is significantly cheaper (e.g. garlic from China). All of these factors combine to make the Australian market difficult to penetrate and highlight the need to be very careful in selecting commodities for development of marketing pathways.

However, it is also recognised that Eastern Australia is a large market compared to New Zealand, with almost 11 million people (half the population) in the three eastern capitals (Brisbane, Sydney and Melbourne), a high degree of cultural and culinary diversity, a strong exchange rate relative to the Fiji dollar (and most other currencies), and high domestic food prices, especially in the last two years. Moreover, experience with development of air freight exports of pawpaws to Australia, and the sea freight trade in taro, demonstrates that well-selected niche markets can be profitably accessed. In addition, Fiji has developed considerable capacity in its fresh produce export sector through a dozen or so well established export businesses and the Nature's Way Cooperative (NWC) High Temperature Forced Air (HTFA) fruit fly treatment facility.

1.3 PHAMA's Strategic Framework

Although Fiji is the only PIC with a substantial agricultural export commodity (sugar), its agricultural export performance has been generally disappointing. In contrast, developing countries globally have benefited from increased trade in high-value agricultural and horticultural products over the past 20–30 years. The relatively poor performance of Fiji and other PICs in this area is particularly disappointing considering: (i) these are agriculture-based economies, often with very limited alternative development opportunities; (ii) the comparative advantage often cited for the region in the production and export of a wide range of agricultural and horticultural products; (iii) the close proximity of some reasonably affluent markets; and (iv) the commonly acknowledged role of economic growth and trade as a mechanism for promoting regional stability.

Difficulties in dealing with the regulatory processes associated with accessing key markets are a major reason behind this poor performance. Progress in negotiating new or improved access has been slow, resulting in a high level of frustration within industry and wasted export opportunities. New market access agreements have been few and hard won, and trade in some products has stagnated (and in some cases declined) due to the imposition of more onerous protocols for products that were historically traded with relative ease.

Key constraints to improving market access include: (i) poor identification of priorities, leading to the limited resources being spent on submissions that are unlikely to be successful, or even if successful unlikely to result in significant trade benefits; (ii) limited capacity of regulatory agencies to prepare and

progress high-quality market access submissions; (iii) limited capacity to comply with negotiated market access protocols; (iv) limited capacity to conduct the research and development (R&D) required to establish, improve or maintain market access; and (v) lack of industry consultation and involvement in market access work.

PHAMA is designed to address these constraints by providing practical and targeted assistance to help resolve priority market access issues of a technical/ regulatory nature.

The Program adopts a strategic approach to addressing the technical/regulatory aspects of markets, working with identified highest priority products and issues. These potentially involve: (i) seeking new access for new products into new markets; (ii) improving access arrangements for existing trade (e.g. through negotiating less onerous quarantine requirements); or (iii) maintaining access by developing the capacity of quarantine agencies and industry to meet access protocols, and assisting with responses to potential breakdowns in trade. Emphasis is placed on achieving early wins, introducing semi-processed products, and accelerating the progress of submissions that are already in progress.

The focus of the Program is on high-value primary products (fresh and processed), particularly agricultural and horticultural. While Australia and New Zealand will inevitably continue to be major markets of interest, issues and opportunities relating to other markets (e.g. Japan, European Union, United States, Canada, intra-Pacific trade) will also be addressed if duly prioritised. Specific issues to be addressed will be selected on the basis of (i) potential economic impact; (ii) cost of establishing/improving access and probability of achieving a successful outcome; and (iii) potential distributional impacts for more marginalised households and women.

Major emphasis is placed on developing a strong partnership between industry and national government agencies. The private sector needs to drive the identification of products to be targeted; it should be fully consulted during the development of market access submissions and agreements; it needs to play a major role in determining R&D priorities; and it needs to be an active partner in the implementation of market access protocols. Development of strong and functional MAWGs is central to achieving this partnership.

1.4 Study Methodology

The seven candidate commodities were assessed in terms of their prospects for profitable penetration of the Australian east coast market (comprising the cities of Brisbane, Sydney and Melbourne). A three-stage screening process was employed:

- Analysis of **supply issues**, including the current volume and seasonality of supply, processing and transport requirements, experience in exporting to New Zealand and/or other markets, and other factors influencing Fiji's capacity to supply the Australian market for the seven target commodities. This work was undertaken in collaboration with the major exporters, as well as with the Biosecurity Authority of Fiji (BAF) and the Ministry of Primary Industries (MPI).
- Analysis of **demand issues**, based on five years of detailed market information from the Brisbane, Sydney and Melbourne wholesale markets, as well as visits to two of these (Sydney and Melbourne) for discussions with importers, wholesalers and retailers.
- **Value chain analysis** of marketing costs and margins to estimate the total gross margins available to share among growers and exporters.

This screening and analysis methodology provided some clear conclusions on the priority products that should be targeted for the development of new export pathways.

2 Production and Marketing of Horticultural Products

2.1 Agricultural Sector Overview

Fiji's agricultural sector is generally considered in three parts: sugar, non-sugar commercial and subsistence. The sugar sub-sector has struggled in recent years due to loss of preferential access to the European Union market, the expiry of many of the long term leases for sugar lands, and the financial difficulties of the Fiji Sugar Corporation. The non-sugar commercial sub-sector is where horticultural export crops are mainly grown, and has shown improvement in performance over the last decade with the development of export market outlets, mainly to New Zealand, as well as the growth of the domestic market. The subsistence sub-sector is the basis of a third of the population's livelihood and focuses mainly on traditional fruits, vegetables and root crops, with some produce entering domestic market channels, but very little being exported.

2.2 Sector Development Strategy

The Ministry of Agriculture, Sugar and Land Resettlement (now called the Ministry of Agriculture and Primary Industries) *Strategic Development Plan 2006–2008* has provided the framework which guides the activities of the Ministry. Key objectives of the strategy are to:

- Improve resource management (implement environmentally-friendly land and water management principles and farming practices);
- Improve productivity and output (adapt appropriate technologies to improve productivity, increase food production and income generation. Diversify into areas of comparative advantage);
- Conduct effective research, development and information dissemination (improve means of collecting data and information). Develop appropriate production technology research;
- Engage in applied research suitable for local conditions of agricultural production;
- Publicise and disseminate research findings and technologies;
- Improve trade market access (hasten transition from subsistence to commercial agriculture). Expand available market access and secure new niche and value added markets. Optimise opportunities for both domestic and external trade. Enhance knowledge and expertise in trade policy;
- Expand available market access and secure new niche and value-added markets; and
- Enhance stakeholder participation.

2.3 Agricultural Production and Trade

Agriculture is an important part of Fiji's economy, contributing around 28% to total employment in the formal sector and indirectly employing many more. Agriculture now constitutes only 8.2% of GDP, down from around 15% in the mid-1990s (see Table 2-1). Most of this decline is attributable to the sugar sub-sector, which has roughly halved in the last decade. The subsistence sector has actually increased its share of GDP slightly, reflecting its ongoing importance as a means of livelihood. Livestock production has also grown, with a focus on the modern pig and poultry industries.

Table 2-1 Contribution of the agricultural sector to GDP (percent)

Contributor	2005	2006	2007	2008	2009	2010
Subsistence	2.7	2.7	2.7	2.7	2.8	2.8
Crops, livestock and horticulture	3.1	3.1	4.0	4.0	3.1	3.1
Sugar cane	3.0	3.4	2.4	2.2	2.2	1.1
Taro	1.7	1.5	1.2	1.4	1.4	1.2
Total agricultural sector	10.6	10.7	10.4	10.5	9.5	8.2

Source: DPI Annual Report 2010

The key trends in the agricultural sector trade are shown in Table 2-2. Growth in agricultural exports has lagged behind imports, particularly since 2005, with the result that Fiji experienced a negative sector trade balance in 2010 for the first time, other than a small negative balance in 2002. This is due to declining sugar exports, as well as increasing imports of meat, vegetables and prepared food. The decline in the value of the Fiji dollar relative to major trading currencies has also made imports more expensive.

Table 2-2 Total agricultural trade (FJD million)

Year	Exports	Percentage of total exports	Imports	Percentage of total imports	Agricultural sector trade balance
2000	419	38	255	14	164
2001	470	37	348	17	122
2002	331	40	350	18	-19
2003	415	36	378	17	37
2004	448	40	396	16	52
2005	511	45	403	15	108
2006	526	48	439	14	87
2007	554	48	450	16	104
2008	670	46	587	16	83
2009	602	51	580	21	22
2010	581	38	633	18	-52

Source: DPI Annual Report 2010

2.4 Agricultural Sector Performance

Over a long period, performance of the agricultural sector has generally been considered disappointing. The small size of the domestic market and poor access to export markets is a major contributing factor to poor performance. However, there are enough success stories to give confidence that sectoral performance can be revived if market access constraints are successfully addressed.

The main non-sugar export crops include taro (dalo), kava, ginger, and cassava. However, horticultural products (particularly pawpaws and vegetables) are the fastest growing component of agricultural exports. While taro production and exports appear to be increasing, production and exports of kava and ginger have declined. In the case of kava, the decline is due to bans on imports of

kava by the major developed country markets. In the case of ginger, production is declining because the main producers (Chinese farmers) are leaving the industry and attempts encourage new producers have had little success. Fiji has formally requested access to the Australian market for ginger, determination of which is imminent. If access is established, this is expected to have a considerable impact on reviving the industry.

Besides taro and cassava, rice consumption is the main source of calories in Fiji. Most rice demand is met through imports and there have been persistent calls for domestic rice production to replace imports. But despite substantial investment in developing infrastructure for irrigated rice and promoting rice farming schemes – as well as a period of tariff protection – rice production has stagnated. Most government-initiated irrigated rice schemes have failed, although rain-fed rice growing for personal consumption has performed much better than the irrigated farming schemes.

Pawpaw production has increased recently, mainly as a result of establishing export markets in Australia and New Zealand through overcoming quarantine concerns in these countries. The production of other fruits such as mangoes, pineapples, bananas, and watermelons has received considerable government assistance over the years, but it has been difficult to maintain consistent supplies of good quality fruit.

Larger-scale commercial farmers have been operating in dairying, beef cattle and pig-raising, and the growing of ginger, fresh vegetables, and taro. However, investment in commercial farming is slow and there are relatively few corporate farming enterprises, primarily in the poultry industry.

The number of people dependent on subsistence agriculture is declining due to increasing rural-urban migration. Between 1996 and 2007, the number of Indo-Fijians living in rural areas declined from 171,000 to 134,000, which exceeded the increase in rural indigenous Fijians from 232,000 to 263,000. These demographic trends point to increasing opportunities in the domestic market for farmers, which is a logical first step in the progression from subsistence to semi-commercial and eventually commercial farming, and provides a platform for further development of export markets.

Remittances also influence the direction of agricultural production and marketing. Remittances are increasing and a large share of these are going to the rural areas, where they are partly used to purchase foods, thus reducing reliance on subsistence food production, and increasing the availability of locally produced foodstuffs in urban markets. The increase in urban food sales suggests that some of what was previously consumed as subsistence production is now being sold in urban markets.

2.5 Institutional and Regulatory Framework

Fiji has four key institutions which are essential for the development and maintenance of the horticultural export sector. These include the **Department of Agriculture** (DOA), under MPI, which provides the necessary research and extension support for horticultural production and marketing, and will play a key role in supporting farmers to respond to new export marketing opportunities. **BAF** was created about a year ago and has a key role in administering the Fiji-New Zealand **BQA**, which has underpinned the establishment of a vibrant fresh produce export trade with New Zealand. BAF is also responsible for maintaining a high level of quarantine protection for Fiji – which is itself important in accessing export markets. The BQA defines protocols for production, harvesting, storage, packing and exporting of a number of fresh produce commodities (see list in Appendix A). BAF provides inspection and certification services to verify that BQA protocols are being implemented along the marketing pathway from farm through to point of export. Similar (or stricter) protocols and certification

arrangements will be required for the development of new export pathways to Australian markets. Finally, there is **NWC**, which operates the HTFA facility near Nadi international airport, which is an essential component of maintaining export market access for fruit fly host species. The operations of NWC are supervised and certified by BAF.

2.6 Horticultural Export Potential

A strategic analysis of Fiji's fresh produce export potential undertaken in 2003 (see Appendix B) remains valid today. The analysis noted that:

- Horticultural exports have performed relatively well during a period when the traditional commodity sectors, particularly sugar and copra, have struggled.
- The horticultural export sector is based on small farmers and includes ginger, tropical fruits, root crops and vegetables, and is now, after years of disappointment, the fastest growing part of the agricultural sector.
- Fresh produce exports would have been significantly greater if the Australian market had not remained closed for quarantine reasons.
- The continued growth in niche horticultural exports has confirmed the competitive advantage of this area of Fiji's agriculture, although this has not been sufficient to offset the demise of the sugar industry.
- 150,000 Indo-Fijians have migrated to Australia, New Zealand and Canada. These people maintain a strong demand for products from Fiji. The large and increasing Asian and Pacific Island population also offers a significant market for many of these products.
- The horticultural export industry has been built around air freight capacity, which is linked to the number of people visiting Fiji. The limitation on the volume and weight of air cargo and the cost of air freight has undermined the competitiveness of some products in some markets.
- Sea transit times to New Zealand are 3–6 days and to Australia 10–16 days, making sea freight export feasible for some fresh produce. Current (2012) freight costs are around FJD1.70 per kg by air compared to FJD0.30–0.50 per kg by sea.
- The establishment of the HTFA facility by NWC has enabled Fiji to continue exporting fruit fly host species after ethylene dibromide (EDB) treatment was banned. The existing HTFA facility has the capacity to handle a substantial increase in throughput.
- New Zealand has adopted a simple protocol for import of non fruit fly host species which has allowed for substantial trade in items such as chilli and okra. Other items such as eggplant and pawpaw are exported, the latter also to Australia, after HTFA treatment.
- The best strategy for penetrating the Australian market is to target the July to September winter window with superior quality produce. Fortunately, this is Fiji's peak supply period for many items.

The strategic analysis also included an assessment of the capacity of the horticultural export sector to take advantage of identified market opportunities. Key capacity issues include:

- **Farmers and production systems:** the ability of many farmers to grow some export crops according to the exacting quality standards is recognised as a constraint. Farmer training and extension needs to include marketing and entrepreneurship as well as the traditional technical support.
- **Traders and middlemen:** the success of horticultural exports can be largely attributed to the skill and resilience of the produce exporters. It would be unwise to intervene in commercial marketing arrangements as long as these remain competitive. However, there are measures that could be

taken to encourage the system to deliver better quality produce for export markets, including incentives for adoption of plastic field boxes and training programs in fresh produce quality and handling.

- **Physical infrastructure** such as roads, wharves, airports, telecommunications, electricity and water supply is essential for efficient movement of produce from farmers to the consumer. Public investment in such infrastructure can lead to a major produce marketing response.
- **Air freight capacity and cost:** the only way to export significant volumes of produce at reasonable cost is by sea. Fiji has international standard ports at Suva and Lautoka, but most ships sail to Australian ports via Auckland, which increases the transit time. In addition, there are no international ports on Vanua Levu.
- **Quarantine barriers:** export protocol development based on risk assessment procedures needs to be strengthened and accelerated (a key objective of PHAMA). This calls for a program of professional upgrading in order to establish a technically competent quarantine service (now actioned through creation of BAF).
- **Research support** is required to enhance product quality, reduce marketing costs and improve market access.
- **Accelerating export protocol development:** it was recommended that a steering committee be established for the specific purpose of export protocol development – the Fiji MAWG has subsequently adopted this role.

2.7 Horticultural Production

Appendix C provides an analysis of statistical information on production and exports of the commodities that are the subject of this study. Trends in production of the key commodities are given in Table 2-3.

Table 2-3 Production of selected horticultural commodities, 2002–2011 (tonnes)

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Breadfruit					45		386		34	769
Jakfruit										
Pineapple	1,865	2,787	3,488	2,985	3,205	2,032	3,506	3,606	3,358	4,136
Chilli	552	938	687	698	667	487	258	220	279	135
Eggplant	1,356	1,285	1,479	1,399	1,326	1,585	923	850	1,777	327
Bitter Gourd										
Okra	980	1,401	1,219	1,068	864	428			773	428
Pawpaw	1,179	2,403	2,757	1,871	2,768	9,091	7,265	2,446	2,190	3,065

Source: Reports from Extension Service. Blank cells indicate no reports.

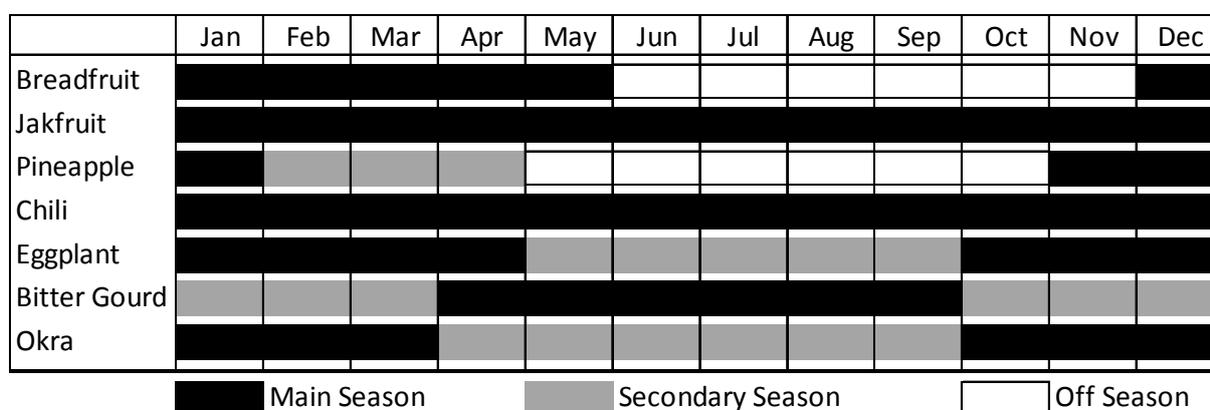
Information on the production of **breadfruit** is limited and there is no information on **jackfruit** production. Both of these items are produced informally from backyard and scattered trees, with surpluses to household needs finding their way into local and occasionally export markets. **Pineapple** production has shown a steady uptrend over the last decade, but has the potential to expand much further if export markets can be developed. Currently, almost all pineapples are sold on the domestic market. **Chilli** production appears to be trending downwards but is adequate to supply the export market in New Zealand. **Eggplant** production fluctuates between 1,000 and 1,400 tonnes per annum (but was much lower in 2011) and supplies both domestic and New Zealand export markets. There is

no information on production of **bitter gourd**, but this is assumed to be very low because little is seen in the local markets. Production of **okra** appears to be declining, but exports are gaining an increased share of the market.

Production figures for **pawpaw** are included as an example of what can happen when export pathways are opened up. Production of pawpaw has tripled between 2002 and 2011, mainly driven by export market development. There was a large spike in production in 2007 and 2008 that could not be absorbed by the markets. However, this demonstrates the substantial upside potential for production of pawpaws.

Production of most horticultural commodities in Fiji is **not markedly seasonal**, reflecting the country’s wet tropical climate with favourable year-round growing conditions, supplemented by irrigation in some areas (e.g. Sigatoka Valley). Breadfruit, however, is seasonal. Pineapple has a natural seasonality which can be managed to obtain year-round production by adjusting the time of planting and use of hormones to regulate flowering. The four annual crops under consideration can be produced year round. However, Australian market prices for many of these crops tend to be higher during the second half of the year, during the winter and spring months. This suggests that annual crops for export to Australia should be planted in March–April–May, so that production peaks during the July to October period. This is also the period when prices tend to be higher in New Zealand.

Figure 2-1 Seasonality of production for the target horticultural crops



Source: DOA crop calendar

Technical recommendations on production of breadfruit, pineapple, chilli, eggplant and okra (as well as many other crops) are provided in a series of technical notes and crop gross margin budgets produced by DOA. The technical recommendations are summarised in Appendix D, and the crop budgets that have been used in the value chain analysis for pineapple, chilli, eggplant and okra in Appendix G.

The latest **agricultural census** (see Appendix E) provides some limited information on production of the target commodities. The census recorded about 3,400 farms producing eggplant, with an average of 0.17 ha planted per farm. Around two-thirds of the crop is produced in the Western Division and most of the remainder in the Northern Division. There are about 1,700 farms producing okra on average plot sizes of around 0.23 ha, with three-quarters coming from the Western Division. Pineapples are grown on around 900 farms, with around 0.5 ha per farm. Production is more widely spread in the Central, Western and Northern Divisions. Breadfruit and jackfruit are grown on a large number of farms, generally with only 1–5 trees per farm.

2.8 Export of Horticultural Produce

Appendix C also presents data on exports of the key commodities to various markets from 2002 to 2010. The volume of exports is shown for each commodity by destination, including New Zealand, Australia, North America (USA and Canada) and other countries. For the principal export commodities (chilli, eggplant and okra), New Zealand was the destination of between 94% and 97% of exports. Australia is only a significant destination for pawpaw, for which it accounted for a third of exports over the period. New Zealand was also the major customer for pawpaw, taking 57% of pawpaw exports. However, Australia's imports of Fiji pawpaws have been increasing in the last five years, again demonstrating what can happen once export pathways are opened up.

Comments on the pattern of exports for individual items are as follows.

- **Breadfruit** exports grew from 5 tonnes per annum in 2002 to 35 tonnes in 2007, but have since fallen to very low levels. New Zealand has been the main destination. Australia imports 1–4 tonnes a year, almost all in frozen form.
- **Jackfruit** exports have generally been in the 20–30 tonne per annum range. However, there was an apparent large increase in exports in 2010, with more than 160 tonnes reported as fresh jackfruit exports to Australia. This apparent increase may be due to a statistical reporting error, since there is no approved import protocol for jackfruit.
- **Pineapple** exports have been very minimal over the last decade. However, this may be about to change, as pineapple has recently been added to the list of BQA commodities.
- Fiji normally exports about 50–60 tonnes of **chilli**, mainly to New Zealand. Three varieties of chilli are listed as BQA commodities: red fire, hot rod and birdseye. The potential in the Australian market is likely to be 3–5 times the volume exported to New Zealand and could include other varieties currently grown in Fiji such as “chilli bongo”, normally known as habanero.
- **Eggplant** exports, mainly to New Zealand, have been growing steadily and exceeded 500 tonnes in 2010. These are mainly the variety known as long purple, which is favoured by Indo-Fijians in New Zealand.
- **Bitter gourd** exports are negligible.
- The **okra** export market has been growing steadily and now exceeds 250 tonnes per annum, almost all going to New Zealand. There have been occasional small shipments of okra to Australia. However, it is not widely known that there is an approved import protocol for okra from Fiji.
- **Pawpaw** exports are running at 300–500 tonnes per year. Pawpaws are the only horticultural export commodity, apart from taro, for which Australia is an important destination. Japan was a fairly reliable export customer for pawpaw in 2002–2005 but has since dropped out of the market.

2.9 The Domestic Market

An export marketing strategy for any horticultural product must also consider the requirements of the domestic market, which remains an important outlet for most of the products that are exported or potentially exported to Australia and other destinations. Most of the locally traded produce goes through the urban retail markets, although there are increasing sales through supermarkets and to tourist hotels and restaurants. Tourist arrivals are now about equal in number to Fiji's resident population; however, with an average stay of ten days, demand for food from the tourism sector only adds about 3% to domestic demand. The tourism market presents similar demands to the export market in terms of quality, presentation, packaging, food safety and reliability of supply, but does not face the same quarantine and transport barriers.

Appendix F presents information on local market prices collected by the DOA price reporting service over the last five years. This provides useful insights into local prices and price seasonality for the commodities under consideration. Comments on the market prices for individual items are as follows (there are no price data for breadfruit):

- **Jackfruit** prices are not always reported, indicating that it is sometimes not available in the market. When available, prices are mostly in the FJD2.00–FJD2.50 per kg range. Prices tend to be higher between June and September.
- **Pineapples** generally trade in a narrow price band of FJD1.50 to FJD2.00 per kg and tend to be more abundant and cheaper in November–December–January. This corresponds with a period of stronger prices in parts of the Australian market.
- **Chilli** prices mostly fluctuate in the FJD4.00 to FJD8.00 per kg range and there is a general uptrend. The prices of bongo (habanero) chillies and mild types tend to move together. Chilli prices do not vary greatly within the year but tend to be lower in May–June and from September until January.
- **Eggplant** prices are usually between FJD1.00 and FJD1.50 per kg but sometimes spike higher. Prices of the two main eggplant varieties (long purple and round) tend to move together. Eggplant prices follow a consistent seasonal pattern, with prices in the second half of the year being significantly lower. This also corresponds with the period of higher prices in Australia.
- **Bitter gourd** prices are usually between FJD2.00 and FJD3.00 per kg and there is no distinct seasonal price pattern.
- **Okra** prices fluctuate quite widely either side of FJD2.75 per kg. Okra prices tend to be lower around April–May–June, and fairly consistent in other months.

3 Australian Market Opportunities for Fresh Produce

3.1 Overview

The Australian market for horticultural products is by far the largest in the region, with more than 22 million relatively affluent consumers. However, domestic production supplies almost all of that market year round. This is unique among developed countries, most of which source fresh produce supplies from around the world, depending on prices and availability.

Figure 3-1 Australian imports of horticultural produce AUD million per annum: 1998–2011

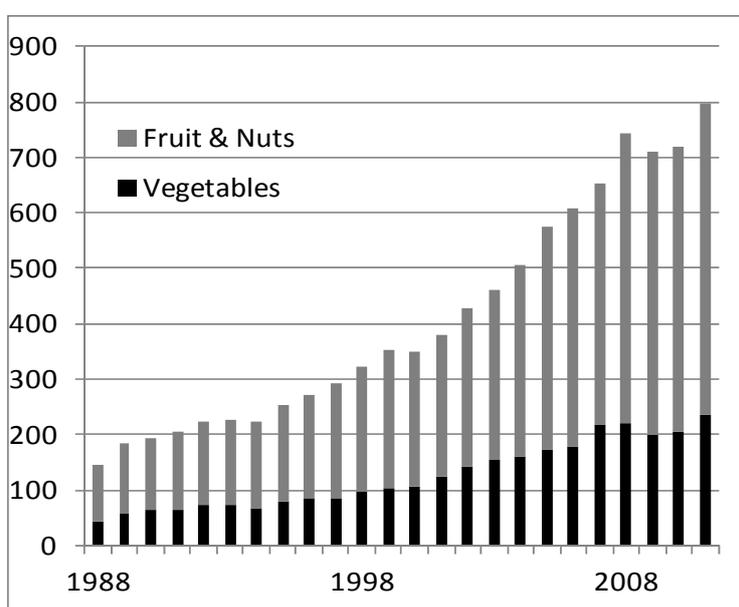


Figure 3-1 shows that imports have grown steadily in line with population and household incomes. Imports of vegetables² now generally exceed AUD200 million per annum and fruits³ exceed AUD500 million. While these quantities may sound large, they only represent 0.05% of GDP and around 0.08% of household expenditure.

Fruit imports are markedly seasonal, with higher levels prevailing in the second half of the calendar year when local temperate fruits are in limited supply. Vegetable imports tend to be less seasonal.

There are a number of reasons why Australia exhibits such a high degree of self-sufficiency in its horticultural produce markets, all of which need to be considered by PICs in formulating market access strategies:

- Australia has a high degree of agro-ecological diversity ranging from tropical to cool temperate. Supplies of many products are maintained year round, from the tropical areas in winter and the temperate areas in summer.
- There are high levels of quarantine protection, ranging from total import bans for some items (e.g. bananas) to strict procedures and protocols for others. No item can be imported unless there are established country-specific and product-specific protocols.

² Defined as “vegetables, fresh, chilled, frozen or simply preserved (incl. dried leguminous vegetables) and roots, tubers and other edible vegetable products, not elsewhere specified, fresh or dried.”

³ Defined as “fruit and nuts, excluding oil nuts, fresh or dried”.

- Compliance with import protocols incurs significant inspection and clearance fees charged by the Australian Quarantine Inspection Service (AQIS), and the time taken to inspect consignments adds to transit times.⁴
- Food retailers, particularly the large supermarket chains, are increasingly concerned about food safety and require their suppliers to employ formal food safety risk mitigation and traceability measures. The supermarkets also employ “ethical sourcing” protocols that require all suppliers to be independently audited with regard to social and environmental standards.
- Australian consumers are accustomed to obtaining the bulk of their food supplies from Australian sources and are strongly averse to buying imported produce. The reasons for this are unclear, especially since so many Australians are recent immigrants. However, retailers report that imported produce is very difficult to sell unless local supplies are limited or not available, or the imported alternative is significantly cheaper.

These five factors combine to make the Australian market difficult and expensive to access. However, there are positive influences as well. Firstly, Australia has a high degree of ethnic and culinary diversity, which creates niche markets for a number of speciality foods that may not be of particular interest to mainstream consumers. Secondly, Australian food prices have become very expensive in recent years relative to other developed countries such as Europe and the United States. This trend has been accentuated by the strengthening of the AUD against most other currencies, which makes imported items more competitive in the Australian market (see Appendix G, Figure G-1 to Figure G-3).

3.2 Target Market Sectors

In terms of **geographic** target, the three eastern seaboard cities (Brisbane, Sydney and Melbourne) present the most attractive and accessible sectors. These have a combined population of 11 million, which is 50% of the national total, or perhaps 65% if nearby cities such as Gold Coast (Brisbane), Newcastle and Wollongong (Sydney) and Geelong (Melbourne) are also included. All of these have direct scheduled flights from Fiji and a regular container shipping service (Fiji–Auckland–Melbourne–Sydney–Brisbane).

The most accessible market entry point is via the **wholesale markets** in each capital city: Rocklea in Brisbane; Flemington in Sydney; and Footscray in Melbourne. These are all large and well-managed wholesale markets which supply the retail sector as well as food service and institutional customers. The operators in these markets include agents who sell on commission, as well as buyers and distributors for retail and other customers. Some of the supermarkets source supplies through the wholesale markets, whereas others have contracts with direct suppliers. Supply chains are often defined along ethnic lines, with middle-eastern market operatives supplying middle-eastern greengrocers, Chinese supplying Asian grocers etc. Fiji exporters will generally find it easier to work with agents who are well connected to the ethnic supply chains rather than those who supply the supermarkets and up-market/boutique greengrocers, where food safety, traceability and “ethical sourcing” procedures can be onerous.

3.3 Wholesale Market Prices and Volumes

All major wholesale markets in Australia have price reporting services, which provide up-to-date market information on a daily, weekly and monthly basis, as well as historical data on prices and (for

⁴ Some major exporting countries (e.g. the United States) have arranged pre-clearance procedures whereby AQIS inspects and clears consignments before they are shipped. This creates cost savings and reduces clearance times after arrival in Australia.

Brisbane only) wholesale market turnover. PHAMA has acquired five years' worth of monthly price and turnover data for the target commodities to help identify marketing opportunities and formulate a market entry strategy. Appendix G presents a detailed analysis of the available data for five of the seven commodities. No information is available on breadfruit or bitter gourd (known in Australia as bitter melon) due to very low turnover.

3.4 Jackfruit

Figure G-4 to Figure G-6 in Appendix G summarise the available market information on jackfruit, which applies only to the Sydney market. Jackfruit prices fluctuate widely in a thinly traded market. Prices for average quality jackfruit are generally in the FJD4.00–6.00 range and tend to be highest in January and February when supplies are minimal. Prices tend to weaken from August until the end of the year. There are no data on the volume of jackfruit traded in any of the markets, but it is likely to be very small and confined to a few traders who supply the Asian greengrocers. Jackfruit is rarely seen in supermarkets.

3.5 Pineapple

Appendix G presents detailed market information for pineapples for the markets in Brisbane (Figure G-7 to Figure G-11), Sydney (Figure G-12 to Figure G-14) and Melbourne (Figure G-15 to Figure G-17). Prices are quoted “per carton”, with one carton generally containing 10–12 fruits with tops off.

Brisbane pineapple prices in Australian dollar terms have shown no discernible trend over the last five years. However, expressed in Fiji dollars, prices have shown a modest uptrend and have settled around FJD30 per carton over the last year or so. This translates to around FJD2.50–3.00 per kg. Prices in Brisbane are only weakly seasonal but tend to be a bit lower in March–April–May. Monthly average sales of pineapples in the Brisbane market have declined from about 750 to 400 tonnes per month over the last five years. The reasons for this are unclear, but may be due to supermarkets sourcing supplies directly rather than through the wholesale market. Rough leaf pineapples (e.g. the Ripley Queen variety grown in Fiji), when available, consistently trade at a premium to smooth leaf varieties. The average premium for “roughies” across all quality classes is around 30%, and availability is very limited in March–April–May⁵, suggesting this as a target window for supplies from Fiji. Pineapple traders report that these always sell very well when available.

Sydney pineapple prices show similar trends to Brisbane, but with prices generally a little higher – around FJD35 per carton for average quality fruit, and with a preference for rough leafed varieties. There is no discernible seasonal pattern in Sydney pineapple prices. Traders consider pineapple a steady business with relatively high turnover but low margins.

Melbourne pineapple prices are higher than in Sydney and Brisbane, which is expected given the long distance from the production centres in Queensland. In Fiji dollar terms, average pineapple prices have trended up from FJD20 per carton to around FJD40 per carton over the last five years. FJD40 per carton equates to about FJD3.30–FJD4.00 per kg. Melbourne pineapple prices also show some signs of seasonality, with higher prices in January–February and generally lower prices in early winter.

⁵ Visits to wholesale and retail markets in Sydney and Melbourne in mid-late February 2012 did not find any rough leaf pineapples.

3.6 Chilli

Appendix G presents detailed market information for chilli for the markets in Brisbane (Figure G-18 to Figure G-22), Sydney (Figure G-23 to Figure G-25) and Melbourne (Figure G-26 to Figure G-28). Prices for chilli are quoted per kg and incorporate a range of varieties in the following broad categories:

- Small birdseye types, which may be green, yellow or red;
- Long chillies similar to the hot rod and red fire varieties grown in Fiji;
- Habanero types similar to chilli “bongo” produced in Fiji;
- Jalapeno chillies; and
- Larger fleshy and sweet types, in various colours, often known as “bull horns”.

In **Brisbane**, wholesale chilli prices have generally been between AUD5.00 per kg and AUD10 per kg for most of the last five years, except for a marked price spike in 2011 related to the Queensland floods earlier in that year. In Fiji dollar terms, average prices have remained above FJD10 per kg for most of the period. There is significant seasonality in Brisbane chilli prices, with below-average prices in March–April–May and premium prices in August–September–October. There are large differences in prices for the different types of chilli, with birdseye red chillies consistently selling for 40–50% more per kg than other varieties. This suggests a favourable seasonal price window and varietal selection for chilli from Fiji.

Monthly average sales of chilli in the Brisbane market have doubled from 20 tonnes to 40 tonnes over the last five years. This reflects the growing popularity of Asian and other spicy foods in Australia. If throughput levels are similar in Sydney and Melbourne, the eastern seaboard wholesale market for chilli would total about 2,300 tonnes, compared to about 60 tonnes currently exported by Fiji.

In the **Sydney** and **Melbourne** wholesale markets, prices and price seasonality for chillies are very similar to Brisbane.

3.7 Eggplant

Appendix G presents detailed market information for eggplant for the markets in Brisbane (Figure G-29 to Figure G-32), Sydney (Figure G-33 to Figure G-35) and Melbourne (Figure G-36 to Figure G-38). Prices for eggplant are quoted per litre of carton capacity, with one litre equivalent to about 0.3 kg of eggplant. The main types of eggplant in the market are the large black varieties (e.g. Black Beauty), but there are many other types as well, including small long varieties known as “Lebanese”, small round varieties known as “Thai Apple” (which are similar to the round type grown in Fiji), and some purple varieties. However, the long purple variety which dominates local trade in Fiji and exports to New Zealand is not seen in Australian markets. The smaller varieties such as Thai Apple and Lebanese tend to sell for higher prices per litre than larger varieties.

Average eggplant prices in **Brisbane** have trended slightly upwards over the last five years and mostly trade between AUD1.00 and AUD1.50/L. Expressed in Fiji dollars, eggplant prices have more than doubled over this period and now trade in the FJD1.50–2.50/L range, which corresponds to about FJD5.00 to FJD8.00 per kg. Price seasonality is similar to many other commodities, with higher prices during the winter and spring months. Monthly volumes traded in Brisbane fluctuate between about 100 and 150 tonnes, which suggests a total wholesale market throughput for the three cities of around 7,000 tonnes per annum. Fiji’s exports currently run at around 500 tonnes per annum.

In **Sydney**, eggplant prices tend to be a little lower on average than Brisbane, probably due to differences in the varietal mix. **Melbourne** prices are about the same as Brisbane, and seasonality in both Sydney and Melbourne is similar to Brisbane.

3.8 Okra

Appendix G presents detailed market information for okra for the markets in Brisbane (Figure G-39 to Figure G-42), Sydney (Figure G-43 to Figure G-45) and Melbourne (Figure G-46 to Figure G-48). Okra is mainly consumed by people from the Middle-East, the Mediterranean and Asia, and tends to be found mainly in greengrocers servicing these communities. It is not widely sold in the mainstream supermarkets.

In **Brisbane**, wholesale okra prices fluctuate in a broad range between about FJD8.00 and FJD15.00 per kg. Prices are significantly higher in winter and early spring and lower in summer and autumn. The volume of okra traded in Brisbane averages only about two tonnes per month but fluctuates widely. Okra sales in the other capital cities are probably much larger, due to the different ethnic composition of the populations.

Okra prices in Sydney and Melbourne are similar, and in Fiji dollar terms have trended upwards from around FJD6.00 to F10.00 per kg in Sydney and FJD6.00 to FJD12.00 per kg in Melbourne. Traders in all markets report a preference for small firm pods less than 5–6 cm in length, which is distinctly different to the okra seen in the local market.

4 Value Chain Analysis

4.1 Methodology

Appendix H presents the findings of a value chain analysis for pineapple, chilli, eggplant and okra exports from Fiji to Australia. The analysis estimates the costs incurred at the various stages along the value chain, including: (i) on-farm production costs (based on crop budgets provided by DOA); (ii) collection and transport costs from farm to packhouse; (iii) costs of grading, washing and packing, including HTFA treatment (where necessary); (iv) cost of transport from Fiji to Australia by air or sea and cost of quarantine inspection and clearance in Australia; and (v) the wholesale market revenue after allowance for product losses and agent's commission. This information is used to estimate the total gross margins available to Fiji growers and exporters based on high, medium and low wholesale prices, with the high and low range being around 20% above/below the medium price. The pineapple value chain is based on sea freight to Melbourne, which offers the best pineapple prices and is the first port of call in Australia on the regular shipping schedule. The other value chains are all based on air freight to Sydney, although similar results would be obtained from air freight to the other two cities.

The analysis for chilli considers two types: long red chillies (hot rod and red fire varieties) and birdseye types which usually enjoy better prices, but also incur higher production and grading/packing costs. The eggplant analysis is based on production, packing and transport costs for the long purple variety as an indicator for the expected results for medium sized eggplant in the Australian market. Pineapples are assumed to be the Ripley Queen variety, which receives premium prices in Australia.

4.2 Results of the Value Chain Analysis

Results of the analysis are summarised in Figure 4-1 below and detailed in Appendix H, together with all of the key assumptions on costs and revenues.

The main conclusions that can be drawn from the value chain analysis are as follows:

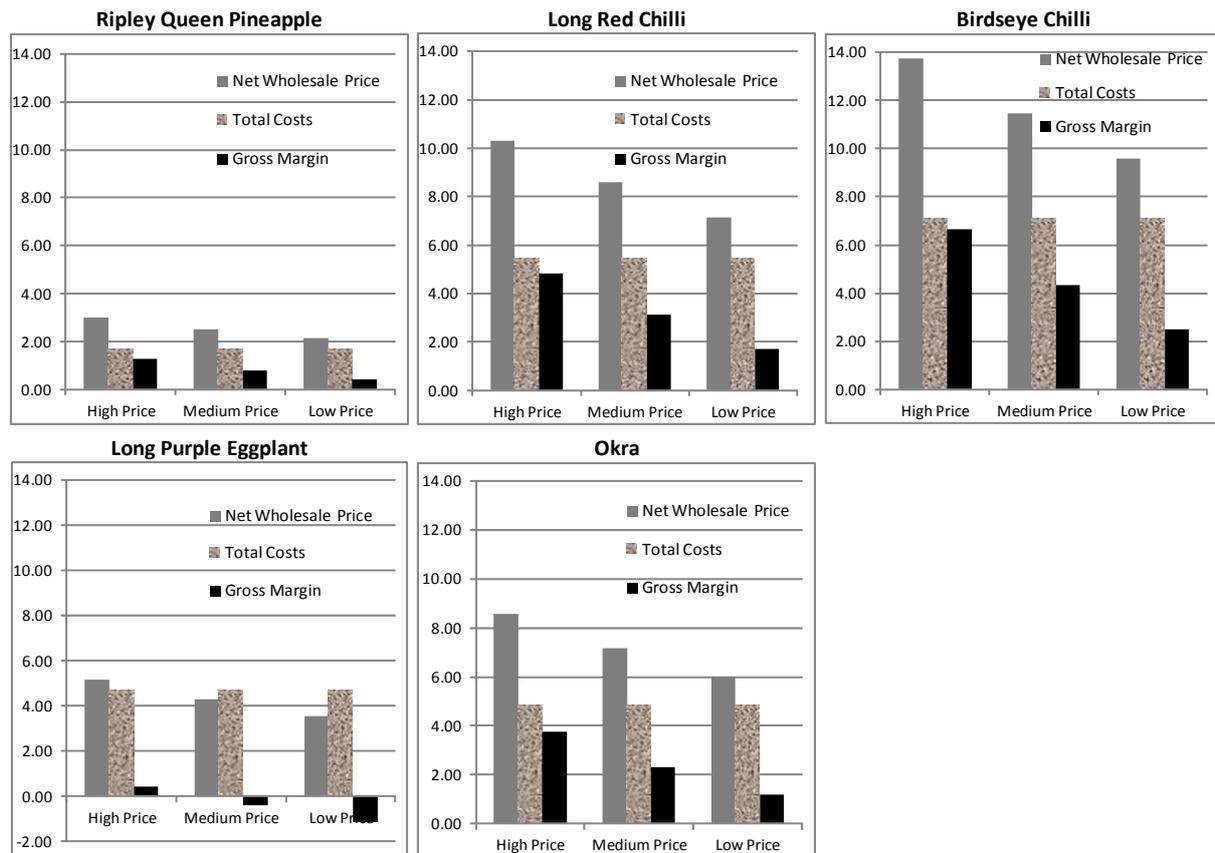
Pineapple: exporting to Australia is likely to be a low margin business, generating a total gross margin of around FJD0.80 per kg at the medium price level. However, because pineapples can be transported by sea freight, and the Australian market is very large, this has potential to become a high volume market opportunity with a focus on the Ripley Queen variety in the Melbourne market. Targeting production to the higher seasonal price window could see margins up to FJD1.20 per kg. Low price periods should be avoided, since margins could shrink to very low levels.

Chilli: attractive margins are likely to be available for chilli sent to Australia by air freight. Costs are much higher than for pineapples, but net wholesale prices per kg are also much higher: on average around FJD8.60 for long red chillies and FJD11.40 for birdseye chillies. Retail prices are as high as FJD20–30 per kg for long red and birdseye respectively. There may be possibilities to boost margins further by using sea freight, but the higher volumes may be difficult to absorb unless the market for Fiji chillies is well established first.

Eggplant: this does not appear to be an attractive option in the Australian market. The costs incurred in the marketing channels are similar to chillies but wholesale prices are considerably lower, at times very low. Better results may be available for Lebanese and Thai Apple types, which generally bring higher prices, but this would first require varietal trials and test marketing. There may also be possibilities of targeting Indo-Fijian communities in Australia, as is the case with export of long purple eggplant to New Zealand. However, none of these possibilities look as attractive as chilli.

Okra: the margins available for okra exports to Australia by air freight are likely to be quite attractive. Okra is a high-priced vegetable that is popular in ethnic communities in Sydney and Melbourne. Small consignments have been sent from Fiji in the past, and the import protocols are in place, so this commodity would appear to present an immediate opportunity, particularly targeting the winter-spring price window.

Figure 4-1 Summary of value chain analysis for pineapple, chilli, eggplant and okra (FJD per kg)



5 Conclusions and Recommendations

5.1 Qualitative Analysis

The seven candidate commodities were assessed in terms of their prospects for profitable penetration of the Australian east coast market. A qualitative analysis is shown in Table 5-1 on the following page, with the positive influences highlighted in green and the negative factors in red. Breadfruit, jackfruit and bitter melon all rank poorly according to this analysis, whereas pineapple, chilli, eggplant and okra all look considerably better.

Table 5-1 Summary of supply and demand issues

	Breadfruit	Jackfruit	Pineapple	Chilli	Eggplant	Bitter gourd	Okra
Supply Issues							
Production volume	High	Medium	High	Medium ^{a/}	High	Very low	Medium
Production system	Informal	Informal	Plantation	Smallholder	Smallholder	Smallholder	Smallholder
Annual or perennial	Perennial	Perennial	Triennial	Annual	Annual	Annual	Annual
Financing needs	High	High	High	Low	Low	Low	Low
Seasonal	Yes	Yes	Yes ^{b/}	No	No	No	No
Suitable for sea freight	No	No	Yes	Uncertain	No	No	Uncertain
Fruit fly host	Yes	Yes	No	Yes/No ^{c/}	Yes	Yes	No
BQA commodity	Yes ^{d/}	No ^{d/}	Yes	Yes ^{e/}	Yes	No	Yes
Established export	Moderate	Moderate	Moderate	Moderate	Strong	Zero	Strong
Exporter interest	High	Moderate	Moderate	Moderate	High	Low	High
Value addition?	Freezing	Freezing	No	Drying, sauce	No	No	No
Exports to New Zealand	Air (Fresh)	Air (Fresh)	Sea (Frozen) Sea (Fresh)	Air (Fresh)	Air (Fresh)	No	Air (Fresh)
Exports to Australia	Sea (Frozen)	Sea (Frozen)	No	No	No	No	Yes
Demand Issues							
Target demographic sector(s)	Pacific Islander	Pacific Islander and Asian	General population	Indo-Fijian and Asian	Indo-Fijian, Arab and Mediterranean	Indo-Fijian and Asian	Indo-Fijian, Arab and Mediterranean
Market size	Very small	Very small	Large	Medium	Large	Small	Medium
Domestic competition	Low	Low	High	Medium	Medium	Low	Low
Type 1, 2 or 3 ^{f/}	Type 3	Type 3	Type 2	Type 1	Type 2	Type 2	Type 1
Australian import policy	No	No	Yes ^{g/}	Yes ^{g/}	No	No	Yes ^{h/}
Estimated gross margin:	Not estimated	Not estimated				Not estimated	
• High price (FJD per kg)			1.30	4.80–6.60	0.45		3.70
• Medium price (FJD per kg)			0.80	3.10–4.30	-0.40		2.30
• Low price (FJD per kg)			0.40	1.70–2.50	-1.10		1.10
Target market(s)	Sydney (SYD)	Brisbane (BNE), SYD	Melbourne (MEL)	BNE, SYD, MEL	BNE, SYD, MEL	SYD	SYD, MEL
Price seasonality	No data	No data	Moderate	Moderate	Moderate	No data	Moderate

Notes:

^{a/} Currently affected by disease outbreak.

^{b/} Can be non-seasonal with hormone treatment.

^{c/} Non host if immature.

^{d/} Listed as “general commodity” if frozen.

^{e/} Limited to Red Fire, Hot Rod and Bird’s Eye varieties.

^{f/} Type 1, existing markets that can be immediately expanded; Type 2, market opportunities that can be developed in a short period; Type 3, opportunities that could possibly be exploited in the longer term.

^{g/} Policy for imports from third countries: pineapples from Philippines, Sri Lanka and Solomon Islands; chillies from Korea (glass house).

^{h/} Existing policy applies to Fiji, but not generally understood by exporters.

5.2 Major Findings by Commodity

5.2.1 Breadfruit

Supply Issues

- Grown mainly as scattered trees and as a backyard crop. No formal plantation production.
- Highly seasonal production.
- Highly perishable – only suitable for air freight.
- Local prices are low in season.
- Fruit fly host, but some fruit exported in frozen form.

Demand Issues

- Only consumed by Pacific Island community in Australia.
- Some production in North Queensland supplying the Australian market.
- Market turnover is very low and not recorded by market reporting services.

Conclusions re: Breadfruit

- Very limited prospects for profitable access to the Australian market.
- Analysis of marketing costs and margins not undertaken.
- Low priority.

5.2.2 Jackfruit

Supply Issues

- Grown mainly as scattered trees and as a backyard crop. No formal plantation production.
- Non-seasonal production.
- Very bulky and perishable.
- Fruit fly host, but some jackfruit exported in frozen/spiced format targeting Indo-Fijian consumers.

Demand Issues

- Consumed by Pacific Islander and Asian communities.
- Wholesale prices fluctuate widely, with average quality fruit generally in the FJD4.00 to FJD6.00 per kg range.
- Some production in North Queensland supplying the Australian market.
- Market turnover is low and prices are only reported from Sydney and occasionally Brisbane markets.

Conclusions re: Jackfruit

- Limited prospects for profitable access to the Australian market.
- Analysis of marketing costs and margins not undertaken.
- Low priority.

5.2.3 Pineapple

Supply Issues

- Well established medium-scale pineapple plantations in Fiji oriented towards supply of the domestic market.
- Production is seasonal but can be regulated using hormonal treatments.
- Consistent supply of fruit with peak in Nov–Dec–Jan.
- Fruit size tends to be small at some times.
- Predominant variety is Ripley Queen (rough leaf) with good eating quality.
- Approved for export to New Zealand under the BQA – not recognised as a fruit fly host.
- Can be exported by refrigerated sea container.

Demand Issues

- Mainstream commodity in the Australian market with sales of at least 2,000 tonnes per month.
- Mainly supplied from Queensland with some imports.
- Prices are higher in Melbourne than Brisbane and Sydney.
- Melbourne prices strongest in Jan–Feb–Mar.
- Rough leaf varieties (e.g. Ripley Queen) sell for around 30% premium, when available.
- Wholesale prices for Ripley Queen in Melbourne range between FJD2.80 and FJD3.90 per kg.

Conclusions re: Pineapple

- Pineapple exports present a high volume/low margin business opportunity in the Australian market.
- Target the Melbourne wholesale market in the summer period.
- Total gross margin available to growers and exporters likely to be in the range of FJD0.40–FJD1.30 per kg – average around FJD0.80 per kg.
- Medium priority – give preference to developing the New Zealand market for pineapples due to existing BQA arrangements and less competition from domestic suppliers.

5.2.4 Chilli

Supply Issues

- Well-supplied in the local market all year round. Many varieties available.
- Good smallholder crop – labour intensive nature gives Fiji an advantage in the Australian market.
- Three varieties BQA-approved for New Zealand: red fire, hot rod and birdseye; exports are taking place.
- Can be produced year round but easier in the dry season.
- Not recognised as a fruit fly host in immature form.
- High prices allow export by air freight.
- May be suitable for exporting by sea freight.
- Also suitable for processing into dried products, sauces, capsicum spray, etc.

Demand Issues

- Mainstream commodity in the Australian market with sales of at least 200 tonnes per month in on the eastern seaboard.
- Sales increasing with growing popularity of Asian foods.
- Many varieties of chilli represented in the Australian market.
- Australian costs of production high due to labour intensive nature of production.
- Chilli approved as an import from South Korea.
- Wholesale prices have remained above FJD10 per kg for most of the last five years.
- Prices are highest in all markets during Aug–Sep–Oct.
- Birdseye red chilli consistently sells for 40–50% premium over other varieties.
- Wholesale prices for long red chilli generally in the range of FJD9.50–FJD13.50 per kg.
- Birdseye chilli wholesales for FJD12.50–FJD18.00 per kg.

Conclusions re: Chilli

- Chilli exports present a high margin/low volume business opportunity in the Australian market.
- Target all three major wholesale markets in the Australian winter-spring period. Establish a position in the market with air freight supply and consider potential for sea freight later.
- Prospects best for smaller/hotter varieties such as birdseye and habanero (bongo) types.
- Total gross margin available to growers and exporters of long red chilli likely to be in the range of FJD1.70–FJD4.80 per kg – average around FJD3.10.
- Equivalent margins for birdseye types likely to be FJD2.50–FJD6.60 per kg – average around FJD4.30.
- High priority – Fiji has a natural competitive advantage due to seasonality, and labour intensive nature of harvesting, grading and packing.

5.2.5 Eggplant

Supply Issues

- Eggplant is well supplied in the domestic market year round, and there is a well-established export market.
- Domestic supply consists mainly of long purple and round purple varieties.
- Long purple varieties are exported to Indo-Fijian communities in New Zealand and to some extent in North America.
- These varieties are not present in the Australian market.
- Eggplant is a fruit fly host and must be subject to HTFA treatment for export.
- Eggplant is not suitable for export to Australia by sea freight.

Demand Issues

- Eggplant is sold in fairly large volumes in all Australian markets.
- Total sales in the eastern seaboard wholesale markets are around 600 tonnes per month.
- There are many varieties sold, including large black (“continental”) types, smaller thin (“Lebanese”) types and small, round (“Thai Apple”) types.
- The “continental” types have the largest market share – these are bulky, soft and perishable and are not well suited to supply by imports.
- The main long purple variety produced in Fiji is not found in the Australian market.
- Prices are only weakly seasonal but tend to be higher in the winter and early spring.
- Wholesale prices for eggplant are generally in the range of FJD4.70–FJD6.70 per kg, but sometimes fall to very low levels during periods of heavy supply.

Conclusions re: Eggplant

- Export of eggplant to Australia would require the introduction and testing of new varieties in Fiji to supply the major wholesale markets, with the smaller “Lebanese” and “Thai Apple” types most likely to succeed.
- Eggplant is a relatively low value commodity in Australia with low bulk density and high perishability.
- The gross margin generated by exports to Australia is unlikely to be commercially attractive, and would very likely incur losses during periods of low prices.
- Low priority – better to focus on the New Zealand niche market among Indo-Fijians.

5.2.6 Bitter Gourd

Supply Issues

- Bitter gourd is a very minor commodity in Fiji, with only a few sellers in the markets.
- Fruit fly host, and not included in the Fiji-New Zealand BQA.
- Probably not suitable for export by sea freight, and market would not absorb sea freight volumes.

Demand Issues

- Bitter gourd (known as bitter melon in Australia) is consumed by Chinese and South-East Asian communities in Australia.
- It is found in specialised Asian greengrocers and supermarkets in Sydney and Melbourne but is usually not offered in mainstream retail outlets.
- Marketing channels for Asian fruit and vegetables are tightly controlled by Asian traders.
- There are no wholesale market data on prices or quantities traded.
- Retail prices are generally around FJD7–8 per kg.

Conclusions re: Bitter Gourd

- Prices for bitter gourd may offer profitable export opportunities from time to time, but volumes are likely to be rather small.
- Wholesale and retail market channels may be difficult to penetrate.
- Low priority – better to concentrate on commodities which are more widely consumed and offering better prices.

5.2.7 Okra

Supply Issues

- Okra is well-supplied in the domestic market and can be produced year round.
- Labour intensive crop which gives Fiji a competitive advantage in the Australian market.
- Not a fruit fly host and is covered by the Fiji-New Zealand BQA.
- Currently exported by air freight to New Zealand.
- Already approved for export to Australia, although this is not widely known.
- A few exporters have sent fresh okra consignments to Australia, although not recently.

Demand Issues

- Mainly consumed by people of Indo-Fijian, Middle Eastern or Mediterranean origin.
- Consistently sells for above FJD10 per kg in major wholesale markets.
- Prices tend to be higher in the second half of the year, particularly July–September.
- Information on volumes traded is limited but probably less than chilli.
- The market favours small, immature okra 5–6cm long and quite firm.

Conclusions re: Okra

- There are sound prospects for exporting okra to Australia by air freight, with priority given to the Sydney and Melbourne markets, where there are larger concentrations of Middle Eastern and Mediterranean people.
- Total gross margin available to growers and exporters of okra is likely to be in the range of FJD1.10–FJD3.70 per kg – average around FJD2.30.
- High priority for immediate development of the export market since it does not require development of market access arrangements.

5.3 Recommendations

The findings of the study clearly point towards **chilli as the highest priority** for development of Australian market access protocols. Chilli is a high value fresh produce commodity and Fiji has good prospects of establishing a profitable market presence with the existing main varieties grown. While the volumes will not be large, initially at least, chilli exports represent a very efficient use of the

available air freight capacity. Even if chilli exports displace existing lower value air cargo commodities, this would still be an overall net gain to the sector. Further expansion of the chilli growing industry also provides opportunities for value-added processing of chilli products such as dried chillies, chilli powder, chilli sauces, and possibly industrial applications like capsicum spray used for personal defence. Potential also exists for sea freight in the longer term, including to more distant markets such as Canada and Japan.

Pineapples are considered second priority as a potential high volume/low margin export commodity. However, the development of Australian market access need not be fast tracked because the development of the New Zealand market will be given priority by exporters. New Zealand represents an easier target market in the first instance because of shorter shipping times, lower shipping costs and less competition from domestic suppliers.

There are **immediate opportunities to begin exporting okra** to Australia under the existing market access arrangements, preferably targeting the winter-spring window of opportunity.

The other four commodities considered all face significant barriers to commercial success and do not justify investment in developing Australian market access.

Appendix A

Appendix A Commodities Included In The Fiji-New Zealand Bilateral Quarantine Agreement (BQA)

BQA Commodities	Abbreviation	General Commodities
Basil	BA	Mango stick
Bele leaves	BL	Sasa broom
Betel leaves	BT	Dalo ni tana
Betel/pan leaves	BP	Taro
Breadfruit	BR	Tamarind
Cassava	CA	Pickles
Chillies (red fire, hot rod and birdseye)	CHrf, CHhr, CHbe	Dry coconut
Chives	CV	Green coconut
Choraiya	CY	Frozen breadfruit
Cluster beans	CB	Frozen cassava
Coconut	CO	Frozen cowpeas
Coriander	CD	Frozen chillies
Cowpeas	CP	Frozen jackfruit
Curry leaves	CL	Frozen pigeon peas
Dill	DL	
Drumstick	DT	
Duruka	DK	
Eggplant	EG	
French beans	FB	
Ginger – Suva	GG	
Kava	KV	
Lemongrass	LG	
Lettuce	LT	
Long beans	LB	
Mango leaves	ML	
Mango	MA	
Mint leaves	ML	
Okra	OK	
Oregano	OR	
Papaya	PA	
Papaya leaves	PL	
Papdi	PD	
Peanuts	PN	
Pigeon peas	PP	
Pineapple	PA	
Plantain	PT	
Rocket (herbs)	R	
Sage	SG	
Snow peas	SP	
Sugar cane	SC	
Taro – Naitasiri area	TR	
Taro leaves	TL	
Tarua	TR	
Tarua leaves	TA	

Appendix B

Appendix B Strategic Analysis of Fresh Produce Export Potential

A strategic analysis of Fiji's fresh produce export potential conducted in 2003⁶ remains largely relevant today. The key findings of the analysis are presented in this Appendix.

B.1 General Overview

Fiji's competitive advantage in agriculture lies in high value, niche market exports and in traditional food production. Since 1996, niche exports and food production have continued to grow, confirming these areas of competitive advantage.

While Fiji's traditional commodity sectors – sugar and copra – are struggling, the situation for horticultural export crops is much more encouraging. This entirely small farmer-based sub-sector includes ginger, tropical fruit, root crops and vegetables. This is now, after years of disappointment, the fastest growing part of the agricultural sector.

Fruit exports would have been significantly greater had not the Australian market remained closed for quarantine reasons. The continued growth in niche horticultural exports has confirmed the competitive advantage of this area of Fiji's agriculture, although this has not been anywhere near sufficient to offset the demise of the sugar industry.

150,000 Indo-Fijians have migrated to Australia, New Zealand and Canada. These people maintain a strong demand for products from "home". The large and increasing Asian and Pacific Island population also offers a significant market for many of these products.

The horticultural export industry has been built around air freight capacity. There is some scope for export expansion within existing airline schedules. However, substantial growth will depend on a significant increase in the number of wide-bodied flights out of Nadi. Thus the future air freight market opportunities for horticultural exports depend on the fortunes of the tourism industry. Around 400,000 people visit Fiji annually.⁷ Apart from the air freight opportunities, this offers a substantial market for locally grown produce.

A more immediate constraint to fresh produce exports by air has been the sharp increase in airfreight rates in recent years, which have undermined the competitiveness of some products to some markets. Current (2003) air freight rates are:

Destination	Container type	Cost per container (FJD)	FJD per kg
Auckland	LD3 (1,400kg)	1,560	1.14
	LD8 (2,300kg)	2,370	1.03
	LD7 (4,300kg)	3,980	0.93
Sydney	LD3 (1,400kg)	1,720	1.23
	LD8 (2,300kg)	2,570	1.12
	LD7 (4,300kg)	4,300	1.00
Los Angeles	LD3	5,190	3.70
	LD8	8,520	3.70
	LD7	15,920	3.70
Tokyo	>1,000 kg		4.25
Vancouver	>1,000 kg		3.50

Source: Fiji Institute of Freight Forwarders and Customs House Agents

⁶ Lincoln International Ltd (2003): Alternative Livelihoods Project: Draft Final Report, Appendix 5: Author Andrew McGregor.

⁷ This increased to 626,000 visitors by 2010.

Appendix B

The sea transit times for New Zealand ports are 3 to 6 days and for Australian ports 10 to 16 days. This makes regular fresh produce sea freight exports to New Zealand and Australia feasible, allowing suppliers to refurbish stock on weekly basis. This compares with 21 to 30 days for North American and Asian ports and 45 days for European ports. Current (2003) sea freight cost of produce to New Zealand is FJD0.17 per kg, compared with around FJD1.23 per kg for air freight.

The horticultural market opportunities can be broadly classified into three types:

- Type 1 opportunities: Existing markets that can be immediately expanded
- Type 2 opportunities: Market opportunities that can be developed in a short period
- Type 3 opportunities: Opportunities that could possibly be exploited in the longer term.

B.2 Quarantine Status Assessment

Most fleshy fruits and vegetables grown in Fiji are regarded as fruit fly hosts by target importing countries – Australia, New Zealand and the United States. Thus, horticultural exports largely stopped when the chemical ethylene dibromide (EDB) was banned as a quarantine treatment in 1992. Fiji was proactive in addressing this constraint. With assistance from USAID, Fiji embarked on an ambitious project to acquire high temperature forced air (HTFA) quarantine treatment technology.

Nature's Way Co-operative (NWC) was formed to own and operate the HTFA facility on behalf of the industry (exporters and growers). The NWC facility was certified for the export of pawpaw to New Zealand in 1996. Today, Fiji has a viable quarantine treatment facility and a growing industry in the export of fruit fly host commodities to New Zealand. NWC currently treats over 500 tonnes of produce (pawpaw, mango, eggplant and bread fruit) annually. This is a viable business not requiring financial assistance from Government. Unfortunately, Fiji's proactive approach to adopting the necessary technology to facilitate the export of fruit fly host products has not been matched by the regulatory authorities in Australia and the United States. The existing HTFA facility has the capacity to handle a five-fold increase in throughput. There are both Type 1 and Type 2 market opportunities available that could fully utilise this capacity.

B.3 Non Fruit Fly Host Products

New Zealand has adopted a simple protocol that allows certain products to be exported under a non fruit fly host protocol. Currently, around 50 tonnes of chillies are exported annually to New Zealand under this protocol. Okra is also regarded as a non fruit fly host for all markets. The New Zealand non-host methodology is based on an experimental procedure that does not require the prohibitive sampling of large quantities of fruit as would be required by the Australian and United States regulatory authorities for a non fruit fly host protocol.

B.4 Type 1 Export Opportunities

Type 1 export opportunities can be broadly classified as:

- Expanding existing HTFA products to New Zealand (pawpaw, eggplant, breadfruit from existing trees, mango);
- HTFA products permitted for export to Australia (pawpaw);
- Expanding existing non fruit fly host products that are permitted for export to New Zealand (pineapples, fresh ginger and chillies);

Appendix B

- Non fruit fly host exports permitted to both Australia and New Zealand (okra, green cow peas and pigeon peas); and
- Root crops (frozen cassava, dalo ni tanna (xanthansoma taro), and yams).

Pawpaw: The export of HTFA-treated pawpaw has increased steadily since 1996 to reach 173 tonnes in 2002. This is projected by NWC to reach 700 tonnes over the next 5 years. This increase is based on a combination of continued steady growth in the New Zealand market, the re-emergence of the Australian market and the responsiveness of Fiji growers to favourable market conditions.

Australia represents a far larger market than New Zealand for pawpaw. In 2001, 6,000 tonnes were sold on Sydney's Flemington Markets alone (Sydney Market Reporting Service). During the 1980s, Fiji was a significant exporter of pawpaw to Australia. Exports to Australia ceased in 1992 when EDB was lost as a quarantine treatment. Seven years on, the Australian Quarantine Inspection Service (AQIS) finally approved the export of HTFA-treated pawpaw exports from Fiji. Since that time, Australia has made progress in developing its own domestic industry. The appropriate marketing strategy for redeveloping the Australian market would be initially to target the July to September winter window with superior quality fruit. Fortunately, this happens to be Fiji's peak supply period. During this period, returns in Australia can be expected to be at least as good as those obtained in New Zealand. Once Fiji pawpaw is re-established in the market, a significant expansion in exports is forecast, with around 350 tonnes projected for 2006. At about that time, sales are projected to be equally divided between Australia and New Zealand.

Eggplant: Once considered to be a relatively minor export product, eggplant has become the major horticultural export. Previously, the market for Fiji eggplant was narrow, being principally Auckland in winter when no locally grown eggplant was available. HTFA treatment has greatly enhanced shelf life compared with the previously chemically treated fruit. Eggplant shipments now continue year-round and are distributed throughout New Zealand – resulting in an over five-fold increase in sales. An annual 5% growth in eggplant shipments to New Zealand is projected (NWC Strategic Plan 2002).

Breadfruit from existing trees: Exports of HTFA-treated breadfruit to New Zealand commenced in October 2001. Five tonnes were exported in 2002. It is projected that a market of about 100 tonnes could be readily developed in New Zealand from existing trees. This projection is based on a combination of indicators: proven suitability to HTFA treatment; existing production base; and a large New Zealand market already in place. The ability to take advantage of the existing stock of breadfruit trees is constrained by Fiji's internally imposed quarantine rules. Undertaking an effective bait spray program for scattered breadfruit trees is difficult. This is a strong argument for establishing small breadfruit orchards for export breadfruit production.

Pineapples: A number of products are already exported to New Zealand under a non-host protocol and some of these have scope for expansion, including pineapples, okra and fresh ginger. A niche market opportunity for fresh pineapple exports to New Zealand has been identified. In 2002, New Zealand imported 4,200 tonnes of pineapples. This market is overwhelmingly dominated by Dole pineapples from the Philippines, who supply an exclusive importer. Dole pineapples "piggy back" on vessels carrying bananas and thus enjoy favourable freight rates. The exclusive relationship between Dole and their importer means that the other major produce importers are denied access to pineapples. These companies are anxious to fill this gap in the product line they can offer to customers and thus are looking for a reliable source of good quality pineapples at a reasonable price. It is estimated that the market for Fiji pineapples in New Zealand is about 500 to 600 tonnes.

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Okra: Over the last three years, an average of 40 tonnes of okra has been exported to Australia and New Zealand. Okra is currently the only fleshy vegetable permitted for export to Australia. The overall market for okra in Australia is substantially larger than New Zealand, although there is competition from domestic production in Queensland. The main target market for expanding Fiji okra exports in Australia is in Melbourne, with its large Lebanese and Greek communities. A five-fold increase in okra exports is feasible. This requires the adoption of a production system that involves daily harvesting to provide optimum quality.

Chillies: Around 40 tonnes of chillies are exported annually. The two varieties “hot rod” and “red fire” are permitted to be exported to New Zealand in green form under a non-host protocol. The main demand is in the winter window from April to June. Recently, approval has been given for red “birds eye” chillies. These pungent chillies are in short supply and command premium prices. An annual market in excess of 100 tonnes would seem a reasonable expectation for these chillies – albeit at a more modest price.

Off-season Pineapples: Around 1,000 tonnes of pineapples are produced annually in Fiji. Virtually all this production is confined to a period between mid-November through to the end of January, during which there are often gluts. For the remainder of the year, the market is undersupplied. It is projected that a further 1,000 to 1,500 tonnes could be sold if supplies were available for most of the year.

Table B-1 Summary of the approximate magnitude of Type 1 market opportunities

	Within 2 years		Within 5 years	
	Tonnes	Value (FJD,000)*	Tonnes	Value (FJD,000)*
Exports				
Expanding existing HTFA exports to New Zealand				
• Pawpaw	250	375	500	750
• Eggplant	275	413	320	480
• Breadfruit (from existing trees)	25	50	100	150
Expanding permitted HTFA exports to Australia				
• Pawpaw	50	75	350	525
Expanding existing non-fruit fly host products permitted for export to New Zealand				
• Pineapples	50	50	600	600
• Okra	25	50	40	80
• Ginger (from cane areas)	30	60	100	200
• Chillies	60	180	100	300
Expanding existing non fruit fly host products permitted to Australia				
• Okra	25	60	150	360
Root crops from the cane areas				
• Frozen cassava	100	200	300	600
• Dalo ni tanna	50	100	200	400
• Yams	50	100	300	600
Total exports	990	1,713	3,060	5,045

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	Within 2 years		Within 5 years	
	Tonnes	Value (FJD,000)*	Tonnes	Value (FJD,000)*
Domestic				
Increased farm household self-sufficiency				
• Increased rice production for home consumption	1,000	500	2,000	1,000
• Increased pulse production for home consumption	500	250	1,000	500
Off-season pineapples	200	200	1,000	1,000
Cassava for food	1,000	400	2,000	700
Livestock				
• Goats	100	400	300	1,200
• Small scale poultry	50	200	150	600
Total domestic	2,850	1,950	6,450	5,000
GRAND TOTAL	3,840	3,663	9,510	10,045

* Exports are valued at the approximate FOB price, while local market products are valued at the approximate wholesale price.

B.5 Type 2 Export Market Opportunities

Type 2 export opportunities can be broadly classified as:

- New HTFA-treated products;
- New non fruit fly host products:
 - Additional products to New Zealand (pumpkins); and
 - Non-host products to Australia (chillies, pumpkins);
- Fresh ginger exports;
- Certified organic products;
- Breadfruit as a crop;
- Medicinal products (kura); and
- Vanilla.

New HTFA-Treated Products: It now seems clear that HTFA will be technically suitable for a whole range of fruits. Fiji now has the opportunity to develop export protocols for bitter gourd, bottle gourd, wi, tomato, lime and passion fruit. Yet only four commodities (pawpaw, mango, eggplant and breadfruit) have yet to be approved, which represent a considerable waste of this resource. Readily available market opportunities have been identified for a number of other products that would be suitable for HTFA treatment. These can be classified as follows:

- Additional products to New Zealand;
- Additional products to Australia; and
- HTFA products to the United States.

With the recent approval by AQIS of HTFA-treated pawpaw, attention now needs to be turned to other HTFA-treated commodities for the Australian market. The immediate priorities should be eggplant and breadfruit. Australia has a much larger population, with a similar ethnic composition to New Zealand. Purple eggplant varieties are grown in Australia, although they are reported to be different than the Fiji varieties. The NWC Strategic Plan assumes that a small volume of eggplant (50 tonnes) will be

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shipped to Australia in 2004. Rapid growth is projected to occur in the following years – 85 tonnes in 2005 and 170 tonnes in 2006. The basis for this rapid growth projection is the New Zealand market experience of HTFA-treated eggplant. Australia offers similar market potential to New Zealand for breadfruit.

Certified Organic Products: There is an opportunity to develop markets based on environmental sustainability, capitalising on the increasing health concerns and environmental awareness of consumers in importing countries. Fiji has a number of distinct advantages in developing certified organic products.

Breadfruit as a Crop: The potential market for fresh breadfruit has been conservatively estimated at 1,000 tonnes, starting with New Zealand and expanding to Australia and the United States. However, such an industry could not be based on collecting fruit from scattered trees supported by an inefficient bait spraying program. Breadfruit under normal handling is a highly perishable crop and cannot be expected to last more than a few days, which would preclude any significant export development. However, findings from Samoa and the Caribbean show that breadfruit is a surprisingly robust crop and can have an extended shelf life if handled correctly.

Table B-2 Summary of the approximate magnitude of Type 2 market opportunities

	Within 5 years	
	Tonnes	Value (FJD,000)*
Exports		
New HTFA-treated products to New Zealand		
• Bitter gourd	25	70
• Other gourds	15	40
• Jackfruit	15	40
• Wi	15	30
New HTFA-treated products to Australia		
• Eggplant	170	300
• Breadfruit	150	300
HTFA-treated products to the United States and Canada		
• Eggplant	300	600
• Breadfruit	100	200
New non fruit fly host products to New Zealand		
• Pumpkins	300	400
Fresh ginger exports		
• Japan	250	350
• Australia	250	350
Certified organic products		
• Increased fruit puree sales	1,000	1,200
• Organic produce to New Zealand	190	475
Medicinal products		
• Sales of kura products to Europe	150	1,200
Breadfruit as a crop	700	1,400

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	Within 5 years	
	Tonnes	Value (FJD,000)*
Vanilla	1	75
Total exports	3,621	7,030
Domestic		
Increased sales of local produce to the tourism sector		
• Tourist consumption in Fiji	3,000	1,000
• “Carry-on” sales to tourist	50	300
Commercial pulses and grains		
• Pulses for human consumption	3,000	2,100
• Grains and pulses for livestock feed	4,000	2,500
Import substitution spices		
• Dried chillies and pepper	5	200
Total domestic	10,055	6,100
GRAND TOTAL	13,676	13,130

* Exports are valued at the approximate FOB price, while local market products are valued at the approximate wholesale price.

B.6 Capacity of the Sector to Take Advantage of the Identified Markets

Farmers and production systems: In a controlled regulated environment such as growing sugar cane, Fiji farmers have performed well. The performance has not been so satisfactory when it comes to growing newer diversification crops requiring independent managerial skills on the part of the farmer. This is not surprising given the generally low level of educational attainment of farmers, which holds back the pace of development. Not only is the entrepreneurial spirit generally lacking but the ability is also scarce and needs to be nurtured. Farmers need to be provided with realistic market and marketing information, including the cost of marketing. Attitudes have to be moved away from selling small quantities at a high price. Farm management extension training needs to focus on increasing farmer income through increased productivity.

Traders and Middlemen: The success of the horticulture export sector can be largely attributed to the skill and resiliency of the Fiji produce exporters. The competitiveness of the marketing system is reflected in the relatively narrow marketing margins of exporters and traders. It would be unwise to directly intervene in the produce marketing system, particularly as it is efficient and competitive. However, there are failures in the marketing system in terms of the quality of the produce delivered to consumers, which is to the detriment of the longer-term income of farmers. There are measures that can be taken that will encourage the system to deliver a better quality product, particularly for export markets. These include:

- Providing incentives for the widespread adoption of plastic field bins by fruit and vegetable farmers; and
- Mounting intensive training programs in fresh produce quality and handling, in conjunction with Industry Councils.

Physical Infrastructure: Good quality infrastructure, such as roads, jetties, wharves, airfields, telecommunications, electricity and water supply, is essential for the efficient movement of produce from the farm to the consumer. Public investment in key infrastructure can lead to a major produce

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marketing response. By the same token, marketing will be seriously constrained, or not occur if key infrastructure is absent, regardless of what other measures are taken.

The only way to export significant volumes of produce at reasonable cost is by sea. Fiji has international standard ports at Suva and Lautoka. However, only Viti Levu-grown produce, or produce transhipped to Viti Levu, can take advantage of this favourable export shipping situation. Vanua Levu does not have international standard port facilities to attract export shipping.

Quarantine Barriers: The biggest weaknesses are in timely **export protocol development** and in establishing efficient pest risk assessment mechanisms for importing planting material. Quarantine needs now to be strengthened and re-organised into a modern technically competent service. A program of professional upgrading needs to be initiated as a matter of urgency.

Research: It is necessary to provide adequate support for research programs to enhance quality, reduce marketing cost and face market access. Some priority research areas identified include: taro mites; eggplant thrips; and kava “die back”. Funds could be provided to other specialist research organisations to solve specific problems.

Accelerating export protocol development: The pace of protocol development needs again to step up if the substantial export potential is to be realised. It is recommended that a Steering Committee be formed for the specific purpose of protocol development. The Committee should consist of the Manager of NWC, the most senior Quarantine Officer responsible for quarantine protocol development, Research Division’s senior entomologist and plant pathologist, and the Head of the Fruit Fly team.

Applied research to develop breadfruit: The realisation of the considerable commercial potential of breadfruit will require a substantial applied research effort. This needs to be multidisciplinary in nature, involving agronomy and horticulture, entomology, harvest and postharvest handling, agricultural engineering, agro-processing and farm economics. Perhaps the most urgent research needs lies in the field of postharvest handling to extend storage life.

Appendix C

Appendix C Fiji Export Market Analysis

Table C-1: Breadfruit exports from Fiji (tonnes)

Table C-2: Jackfruit exports from Fiji (tonnes)

Table C-3: Pineapple exports from Fiji (tonnes)

Table C-4: Chilli exports from Fiji (tonnes)

Table C-5: Eggplant exports from Fiji (tonnes)

Table C-6: Bitter Gourd exports from Fiji (tonnes)

Table C-7: Okra exports from Fiji (tonnes)

Table C-8: Pawpaw exports from Fiji (tonnes)

Figure C-1: Breadfruit exports from Fiji (tonnes): 2002–2010

Figure C-2: Jackfruit exports from Fiji (tonnes): 2002–2010

Figure C-3: Pineapple exports from Fiji (tonnes): 2002–2010

Figure C-4: Chilli exports from Fiji (tonnes): 2002–2010

Figure C-5: Eggplant exports from Fiji (tonnes): 2002–2010

Figure C-6: Bitter Gourd exports from Fiji (tonnes): 2002–2010

Figure C-7: Okra exports from Fiji (tonnes): 2002–2010

Figure C-8: Pawpaw exports from Fiji (tonnes): 2002–2010

The export statistics presented in this appendix were supplied by the Biosecurity Authority of Fiji (BAF). No data are available for 2006 and 2008

Table C-1 Breadfruit exports from Fiji (tonnes)

	Australia	NZ	N.America	Other	Total
2002	0.29	2.70	1.74	0.00	4.73
2003	0.38	6.84	1.20	0.00	8.41
2004	2.12	10.14	1.93	0.00	14.19
2005	2.02	13.50	2.58	0.00	18.09
2006					
2007	4.56	21.56	9.15	0.05	35.31
2008					
2009	0.89	0.06	1.45	0.00	2.41
2010	1.20	2.49	0.87	0.05	4.60

Table C-2 Jackfruit exports (tonnes)

	Australia	NZ	N.America	Other	Total
2002	3.90	1.34	15.06	0.00	20.30
2003	7.47	1.03	20.49	0.00	28.99
2004	15.37	1.91	6.35	0.00	23.63
2005	6.63	2.26	11.46	0.00	20.35
2006					
2007	11.48	5.47	9.79	2.66	29.40
2008					
2009	8.10	14.44	14.29	0.00	36.83
2010	162.71	35.40	4.87	65.95	268.92

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Table C-3 Pineapple exports from Fiji (tonnes)

	Australia	NZ	N.America	Other	Total
2002	0.00	0.65	1.67	0.00	2.32
2003	0.00	0.02	0.29	0.05	0.35
2004	0.00	2.55	0.42	0.11	3.09
2005	0.01	0.02	0.32	0.07	0.41
2006					
2007	0.00	0.00	0.35	0.00	0.35
2008					
2009	0.04	0.28	0.19	0.22	0.73
2010	0.01	0.01	0.10	0.10	0.22

Table C-4 Chilli exports from Fiji (tonnes)

	Australia	NZ	N.America	Other	Total
2002	0.04	50.31	5.75	0.00	56.09
2003	0.45	40.45	3.70	0.03	44.63
2004	0.00	45.16	3.01	0.03	48.19
2005	0.03	50.40	3.26	0.30	53.99
2006					
2007	1.13	137.48	7.06	0.00	145.67
2008					
2009	0.00	1.48	0.00	0.00	1.48
2010	0.17	62.35	1.69	0.21	64.41

Table C-5 Eggplant exports from Fiji (tonnes)

	Australia	NZ	N.America	Other	Total
2002	0.00	245.73	16.36	0.00	262.09
2003	0.00	314.14	6.79	0.02	320.95
2004	0.00	314.51	6.28	0.00	320.79
2005	8.14	67.55	5.75	0.28	81.71
2006					
2007	0.00	465.87	6.54	0.02	472.42
2008					
2009	0.00	417.62	3.17	0.13	420.93
2010	0.00	550.40	6.15	0.68	557.24

Table C-6 Bitter gourd exports from Fiji (tonnes)

	Australia	NZ	N.America	Other	Total
2002	0.00	0.00	0.03	0.00	0.03
2003	0.00	0.14	0.02	0.03	0.19
2004	0.00	0.25	0.00	0.02	0.28
2005	0.00	0.27	0.00	0.12	0.39
2006					
2007	0.00	0.11	0.00	0.00	0.12
2008					
2009	0.00	0.00	0.00	0.11	0.11
2010	0.01	0.22	0.15	0.30	0.68

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Table C-7 Okra exports from Fiji (tonnes)

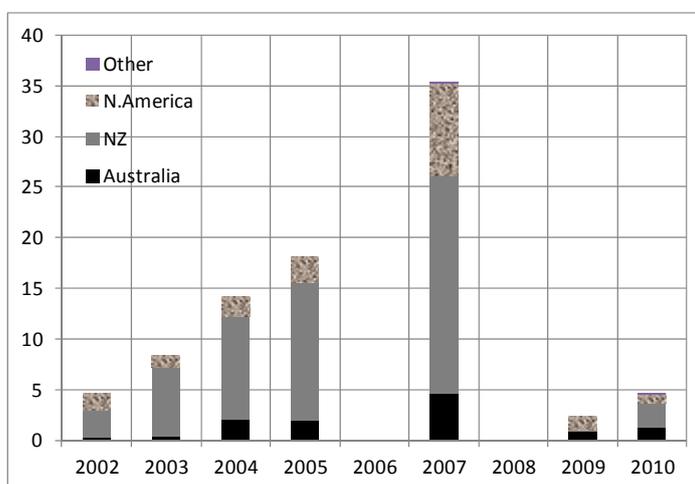
	Australia	NZ	N.America	Other	Total
2002	15.43	137.39	1.25	0.00	154.07
2003	6.51	176.09	1.78	0.01	184.39
2004	2.48	179.49	5.24	0.03	187.24
2005	1.78	179.29	0.62	0.15	181.84
2006					
2007	0.76	202.31	1.39	0.01	204.47
2008					
2009	0.02	287.37	0.77	1.05	289.21
2010	1.42	266.25	1.26	0.60	269.53

Table C-8 Pawpaw exports from Fiji (tonnes)

	Australia	NZ	N.America	Other	Total
2002	0.00	156.74	0.00	40.97	197.71
2003	0.00	137.18	0.00	78.75	215.93
2004	5.60	210.89	0.00	64.22	280.71
2005	46.96	69.80	0.26	22.16	139.18
2006					
2007	303.63	198.53	0.00	9.54	511.71
2008					
2009	204.67	124.89	3.04	0.02	332.61
2010	135.70	294.53	0.08	0.14	430.45

Figure C-1 Breadfruit exports from Fiji (tonnes): 2002–2010

Breadfruit exports grew from 5 tonnes per annum in 2002 to 35 tonnes in 2007, but have since fallen to very low levels. New Zealand has been the main destination. Almost all of the exports to Australia are in frozen form.



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Figure C-2 Jackfruit exports from Fiji (tonnes): 2002–2010

Total jackfruit exports have generally been in the 20–30 tonne per annum range. However, there was an apparent large increase in exports in 2010, with more than 160 tonnes reported as fresh jackfruit exports to Australia. This apparent increase may be due to a statistical reporting error.

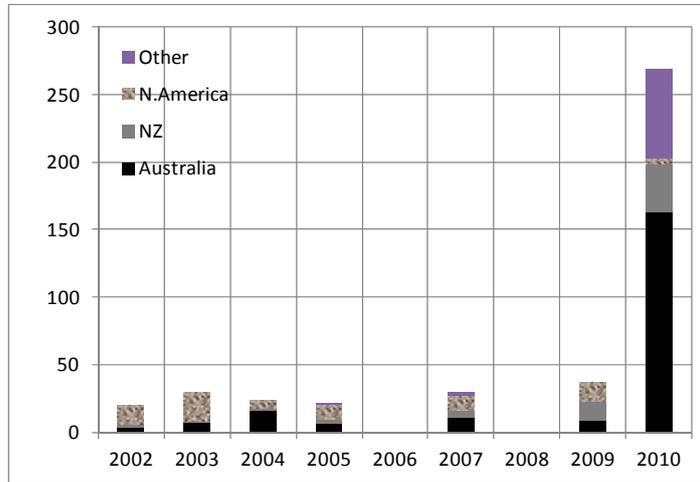


Figure C-3 Pineapple exports from Fiji (tonnes): 2002–2010

Pineapple exports have been very minimal over the last decade.

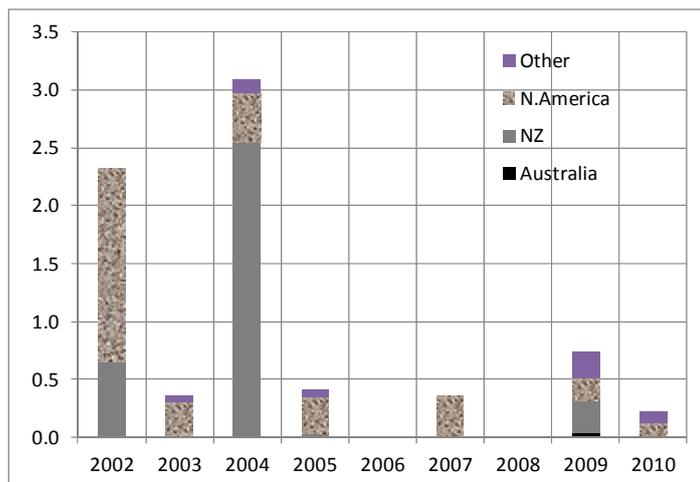
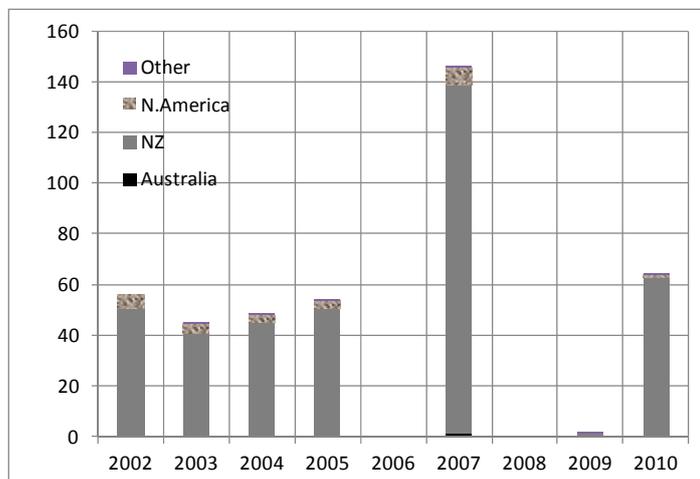


Figure C-4 Chilli exports from Fiji (tonnes): 2002–2010

Fiji normally exports about 50–60 tonnes of chilli, mainly to New Zealand.



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Figure C-5 Eggplant exports from Fiji (tonnes): 2002–2010

Eggplant exports, mainly to New Zealand, have been growing steadily and exceeded 500 tonnes in 2010.

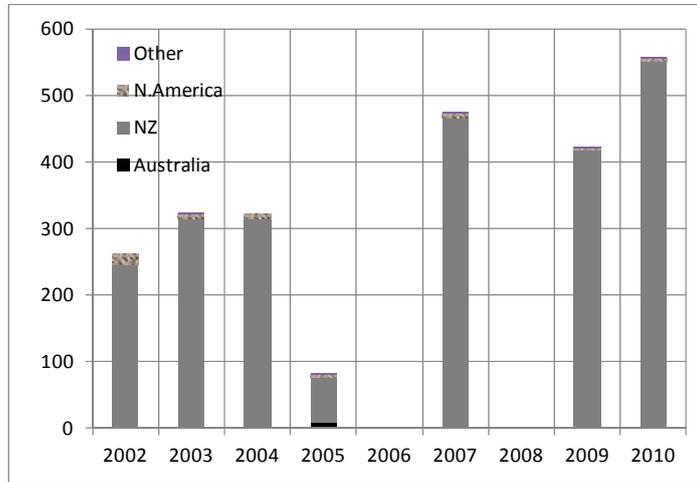


Figure C-6 Bitter Gourd exports from Fiji (tonnes): 2002–2010

Bitter Gourd exports are negligible.

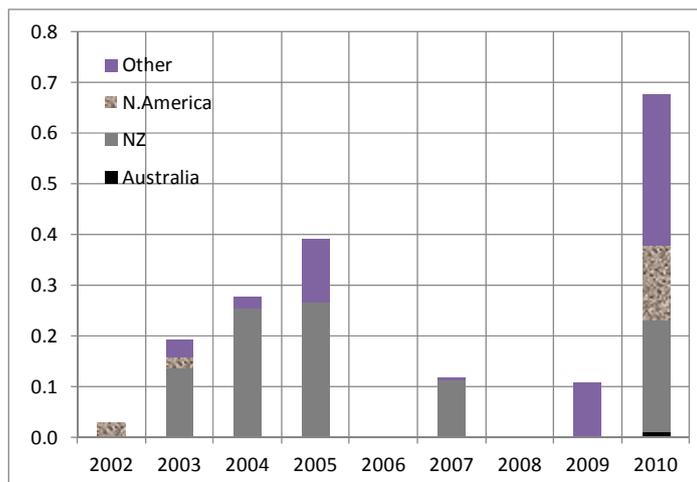
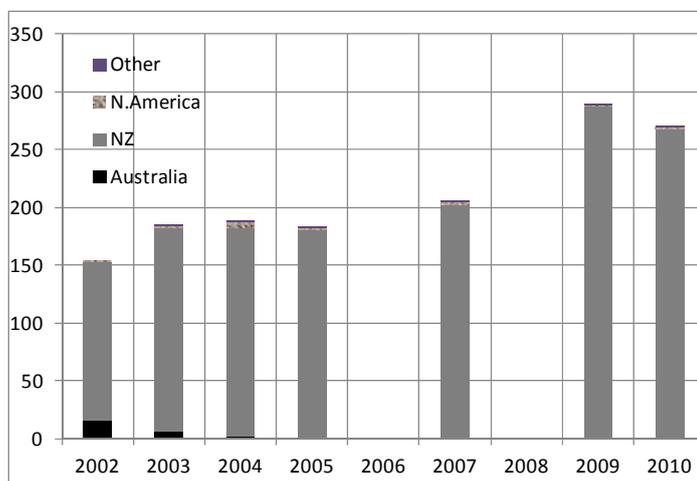


Figure C-7 Okra exports from Fiji (tonnes): 2002–2010

The okra export market has been growing steadily and now exceeds 250 tonnes per annum, almost all going to New Zealand. There have been occasional small shipments to Australia.



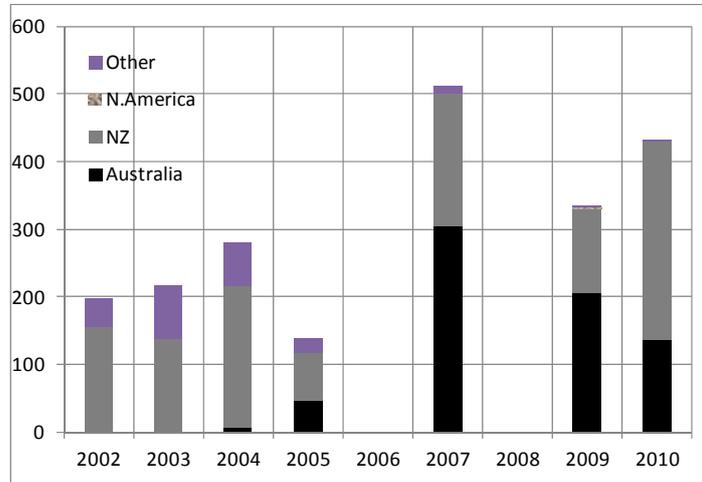
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Figure C-8 Pawpaw exports from Fiji (tonnes): 2002–2010

Pawpaw exports are running at 300–500 tonnes per year.

Pawpaws are the only horticultural export commodity where Australia is an important destination.

Japan was a fairly reliable export customer in 2002–2005 but has since dropped out of the market.



Appendix D

Appendix D Technical Recommendations for the Target Crops

D.1 Breadfruit (*Artocarpus altilis*)

Recommended varieties	Uto Dina, Uto Dina (Kasa Ieka), Bale Kana (Dina), Bale Kana (Waikava).
Seed rate	69 trees per ha: plant in wet season (November to March).
Spacing	12 m x 12 m.
Fertiliser	No research done on fertiliser response. NPK 13:13:21 suggested to be used in small amounts.
Weed control	Ring weed around plants and spray glyphosate (100 mL/L) between rows.
Disease control	Fruit rot: (i) good site selection and field sanitation; (ii) remove diseased fruits to avoid spread of disease. Brown stem rot: Remove diseased fruits to avoid spread of disease.
Insect control	Fruit fly: trees must be bait sprayed each week for seven weeks prior to harvest.
Yield and food value	20–40 tonnes per ha. Plants propagated by marcotting can start flowering within a year, with production achieved in second year. Food value: fair source of Vitamin C, rich in fibre and good source of iron and calcium.

Source: DOA Crop Calendar and Farm Management Manual

D.2 Chilli (*Capsicum annum*)

Recommended varieties	Hot Rod, Red Fire, Long Red Cayenne, Bird's Eye.
Seed rate	300 g/ha: plant during hot wet season from September to February. Can be planted all year round. Germinates 5–8 days after sowing.
Spacing	1.0 m between rows, 30 cm between plants.
Fertiliser	NPK 13:13:21 200 kg/ha basal at planting. Urea 100 kg/ha in split application. Top dressed 2 and 4 weeks after transplanting.
Weed control	Paraquat (150 mL/15 L of water) or glyphosate (100 mL/15 L of water). Inter-row cultivate using scarifier or small power tiller.
Disease control	Stem rot: apply Sundomil (5 g/L of water). Downy mildew: apply Dithane M-45 (22 g/15 L of water).
Insect control	Aphids and Mites: apply Rogor (15 mL/15 L of water) or Suncloprid (4–7 mL/15 L of water). Cutworm and White Fly: spray Acephate 75% at 20 g/15 L of water.
BQA requirements	Red Fire and Hot Rod variety seeds – to be sourced only from Sigatoka Research Station. Apply recommended practices for quality produce. Approved export variety planted in rows and separated from other varieties to avoid cross pollination.
Yield and food value	Fruits appear 3–4 months after planting and harvest weekly for one year. Yield: fresh 16 tonnes, dried 4–6 tonnes. Economic life of crop is one year. (Dried) dietary fibre, calcium, Vitamin A and C, riboflavin, niacin.

Source: DOA Crop Calendar and Farm Management Manual

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D.3 Eggplant (*Solanium melongena*)

Recommended varieties	Chahat, Sitara, Sigatoka Beauty, Pritam.
Seed rate	300 g/ha: plant all year round but best during the hot wet season.
Spacing	1.5 m between rows, 50 cm between plants.
Fertiliser	NPK 13:13:21, 200 kg/ha basal at planting. Urea: 100 kg/ha, side dress 2 and 4 weeks after transplanting. Poultry manure: 10 tonnes/ha, broadcast and mix well in the soil two weeks before planting.
Weed control	Inter-row cultivation. Hoe in the rows carefully.
Disease control	Bacterial wilt: Practice crop rotation with grain and avoid solanaceous crops and weeds. Powdery mildew: Spray apply Benomyl at 10 g/15 L of water or Copper Oxychloride at 60 g/15 L of water. Use Kocide at 30 g/15 L of water to prevent fungal infections. Damping off of seedlings: plant on well-drained soil. Weed and avoid soil infested with root knot nematode.
Insect control	Lygus Bug: apply Malathion (30 mL/15 L of water) or Diazinon (45 mL/ 15L). Tobacco Flea Beetle: apply Malathion (30 mL/15 L of water) or Orthene (20 g/15 L of water). Thrips: apply Confidor (5 mL/15 L of water).
Yield and food value	Harvest 60 to 90 days after planting and continue for six months. Yield 20–25 tonnes/ha. Source of dietary fibre and Vitamin C.

Source: DOA Crop Calendar and Farm Management Manual

D.4 Okra (*Abelmoschus esculentus*)

Recommended varieties	Clemson Spineless, Local Long White, Dwarf Longpod.
Seed rate	8 kg/ha. Plant all year round but better during hotter months.
Spacing	1.0 m between rows, 30 cm between plants.
Fertiliser	NPK 13:13:21, 200 kg/ha basal before planting. Urea 100 kg/h. Side dress 50 kg/ha 2 weeks and 4 weeks after planting. Poultry manure: 10 tonnes/ha, broadcast and mix well in the soil two weeks before planting.
Weed control	Hand weed or hoe when necessary and practice inter-row cultivation.
Disease control	Powdery Mildew: Spray Milcurb, 55 g/15 L of water. Rotate with crops of different family such as eggplant, beans and root crops. Burn crop residues.
Insect control	Spiny Bollworm: apply Cymbush, 15 mL/20 L of water. Corn Ear Worm and Leaf Miners: apply Nitofol, 40 mL/20 L of water. Rose Beetle: Apply Malathion 30 mL/15 L of water. Aphids: Apply Dimethioate at 15 mL/15 L of water. Snails and slugs: use Blitzem pellets and burn crop residues.
Yield and food value	Harvest 6–8 weeks after planting. Yield 15 tonnes/ha. Source of dietary fibre, potassium, calcium magnesium and Vitamin C.

Source: DOA Crop Calendar and Farm Management Manual

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D.5 Pineapple (*Ananas somosus*)

Recommended varieties	Smooth Cayenne, Ripley Queen.
Seed rate	37,000 plants per ha. Plant in dry season (April to July) to prevent base rot. Phased plating recommended for year round production.
Spacing	1.2 m x 0.6 m x 0.3 m (double rows). 1.2 m between ridges, 0.6 m between rows per ridge and 0.3 m between plants. Crown (tops), slips and aerial suckers. Best planting material are suckers weighing 250–300 g or 25–30 cm high. Contour planting should be practiced on sloping land to avoid soil erosion.
Fertiliser	Super Phosphate, 250 kg/ha at planting. Urea, 110 kg/ha one month after planting. NPK 13:13:21, 250 kg/ha at four months interval after planting.
Weed control	Manual weeding or inter-row cultivation from 1–3 months after planting. Thereafter herbicides used to control weeds: Karmax (Diuron 80) or Kovar at 85 g/15 L of water, to be applied to plot before or after flowering.
Disease control	Heart and Root Rot: plant during the dry season with good field drainage. Spray fungicide (Sundomil at 10 g/15 L of water). Base Rot: dip the planting material in fungicide before planting (Agriphos at 5 mL/10 L of water or Funginex at 1 mL/L of water).
Insect control	Mealy Bugs: spray Malathion at 30 mL/15 L or Diazinon at 55 mL/15 L of water.
Yield regulation	Apply Eitherel (Ethyphon) at 75 mL in off season at 100 mL with 1 kg Urea and 250 g Borax in 50 L of water. Apply dose in the centre of plant at 50 mL per plant. Application to be done after 3pm. Harvest five months after hormone application. Repeat application if it rains within 3 hours.
Yield and food value	Plant crop: 40–60 tonnes/ha with average fruit weight 1.0–1.5 kg; first ratoon 30–40 tonnes/ha with average fruit weight 1.0–1.5 kg; second ratoon 20–25 tonnes/ha with average fruit weight 1.0–1.2 kg. Main season November to January; mini season March–April; off season February and late April to October. Good source of Vitamins C and B1, also contains fibre.

Source: DOA Crop Calendar and Farm Management Manual

Appendix E

Appendix E Selected Results from the Agricultural Census

	Farms With Crop	% of Farms	Planted Area (ha)	% of Area	Harvested Area (ha)	Production (tonnes)	Amount Sold (tonnes)	Sold Locally (tonnes)	Total Value (F\$'000)	Value per kg (F\$)	Yield (t/ha planted)
Fiji											
Eggplant	3,424	5.3	571	1.4	395	1,693	959	886	716	0.75	3.0
Gourd	119	0.2	32	0.1	17	105	97	97	63	0.65	3.3
Okra	1,678	2.6	388	0.9	245	912	678	615	686	1.01	2.4
Cassava	38,757	59.6	15,447	36.6	6,680	58,772	32,899	29,536	21,006	0.64	3.8
Dalo	37,106	57.1	15,195	36.0	6,863	56,665	42,758	35,645	49,522	1.16	3.7
Other	38,921	59.8	10,531	25.0	6,250	19,668	12,470	11,700	12,527		
Total Farms/Area	65,033		42,164	100.0	20,450	137,815	89,861	78,479	84,520		

	Farms With Crop	% of Farms	Planted Area (ha)	% of Area	Harvested Area (ha)	Production (tonnes)	Amount Sold (tonnes)	Sold Locally (tonnes)	Total Value (F\$'000)	Value per kg (F\$)	Yield (t/ha planted)
Central Division											
Eggplant	307	1.8	28	0.2	14	146	135	127	111	0.82	5.2
Gourd	73	0.4	28	0.2	14	103	96	96	62	0.65	3.7
Okra	121	0.7	29	0.2	21	207	203	143	278	1.37	7.1
Cassava	14,555	85.8	5,564	39.3	2,633	36,613	25,180	22,697	14,805	0.59	6.6
Dalo	14,412	84.9	7,259	51.3	3,919	40,340	33,019	26,752	35,881	1.09	5.6
Other	6,181	36.4	1,253	8.8	597	6,854	6,231	5,653	6,465		
Total Farms/Area	16,970		14,161	100.0	7,198	84,263	64,864	55,468	57,602		

	Farms With Crop	% of Farms	Planted Area (ha)	% of Area	Harvested Area (ha)	Production (tonnes)	Amount Sold (tonnes)	Sold Locally (tonnes)	Total Value (F\$'000)	Value per kg (F\$)	Yield (t/ha planted)
Western Division											
Eggplant	2,107	9.8	374	3.2	270	1,242	641	578	450	0.70	3.3
Gourd		0.0									
Okra	1,086	5.1	288	2.4	188	617	408	406	353	0.87	2.1
Cassava	10,849	50.7	5,203	44.1	2,590	10,742	6,016	5,386	4,956	0.82	2.1
Dalo	5,599	26.2	2,119	18.0	952	2,978	2,215	1,996	2,218	1.00	1.4
Other	16,294	76.1	3,805	32.3	2,079	6,202	4,301	4,110	4,037		
Total Farms/Area	21,406		11,789	100.0	6,079	21,781	13,581	12,476	12,014		

	Farms With Crop	% of Farms	Planted Area (ha)	% of Area	Harvested Area (ha)	Production (tonnes)	Amount Sold (tonnes)	Sold Locally (tonnes)	Total Value (F\$'000)	Value per kg (F\$)	Yield (t/ha planted)
Northern Division											
Eggplant	954	4.9	168	1.2	110	301	183	180	155	0.85	1.8
Gourd	40	0.2	2	0.0	2	1	0	0	0	0.50	0.4
Okra	470	2.4	70	0.5	36	89	67	66	55	0.82	1.3
Cassava	8,862	45.1	4,112	28.2	1,240	7,501	1,590	1,338	1,186	0.75	1.8
Dalo	11,258	57.3	4,935	33.9	1,702	10,359	6,528	6,013	10,453	1.60	2.1
Other	12,076	61.5	5,279	36.2	3,534	6,190	1,925	1,903	2,013		
Total Farms/Area	19,643		14,566	100.0	6,624	24,441	10,293	9,500	13,862		

	Farms With Crop	% of Farms	Planted Area (ha)	% of Area	Harvested Area (ha)	Production (tonnes)	Amount Sold (tonnes)	Sold Locally (tonnes)	Total Value (F\$'000)	Value per kg (F\$)	Yield (t/ha planted)
Eastern Division											
Eggplant	56	0.8	1	0.1	0	4					3.5
Gourd		0.0									
Okra		0.0									
Cassava	4,491	64.0	567	34.4	216	3,916	114	114	59	0.52	6.9
Dalo	5,837	83.2	882	53.6	289	2,968	997	911	970	0.97	3.4
Other	4,377	62.4	197	12.0	35	443	12	10	14		
Total Farms/Area	7,014		1,647	100.0	540	7,330	1,123	1,035	1,043		

Appendix E

	Farms With Crop	% of Farms	Planted Area (ha)	% of Area
Eggplant				
Central	307	9.0	28	4.9
Western	2,107	61.5	374	65.5
Northern	954	27.9	168	29.4
Eastern	56	1.6	1	0.2
Total	3,424	100.0	571	100.0

	Farms With Crop	% of Farms	Planted Area (ha)	% of Area
Gourd				
Central	73	64.6	32	95.0
Western	0	0.0	0	0.0
Northern	40	35.4	2	5.0
Eastern	0	0.0	0	0.0
Total	113	100.0	34	100.0

	Farms With Crop	% of Farms	Planted Area (ha)	% of Area
Okra				
Central	121	7.2	29	7.5
Western	1,086	64.8	288	74.4
Northern	470	28.0	70	18.1
Eastern	0	0.0	0	0.0
Total	1,677	100.0	387	100.0

	Farms With Crop	% of Farms	Planted Area (ha)	% of Area
Pineapple				
Central	238	26.0	160	35.9
Western	415	45.4	206	46.2
Northern	216	23.6	77	17.3
Eastern	45	4.9	3	0.7
Total	914	100.0	446	100.0

Fiji	Farms With Crop	% of Farms	Planted Area (ha)	% of Area	Bearing Area (ha)	Production (tonnes)	Amount Sold (tonnes)	Sold Locally (tonnes)	Total Value (F\$'000)	Value per kg (F\$)	Yield (t/ha planted)
Breadfruit	81	0.2	8.7	0.0	1.9	10.4	2.4	2.4	1.9	0.79	1.2
Pineapple	914	2.5	445	1.6	300	2,829	2,349	2,342	1,866	0.79	6.4
Yaqona	21,306	58.3	8,884	32.6	3,602	6,067	4,728	4,156	66,395	14.04	0.7
Other	14,242	39.0	17,895	65.7	16,426	16,702	13,563	12,833	8,773		
Total	36,543	100.0	27,233	100.0	20,330	25,608	20,642	19,333	77,036		

Breadfruit a/	No of Farms	No of Trees		No of Trees/Farm	
		Planted	Bearing	Planted	Bearing
Central	4,021	20,871	12,860	5.2	3.2
Western	2,746	12,882	6,875	4.7	2.5
Northern	4,619	26,866	20,794	5.8	4.5
Eastern	919	4,000	1,923	4.4	2.1
Total	12,305	64,619	42,452	5.3	3.4

a/ Scattered trees on farms

Jakfruit a/	No of Farms	No of Trees		No of Trees/Farm	
		Planted	Bearing	Planted	Bearing
Central	792	3,718	2,855	0.9	0.7
Western	541	1,147	919	0.4	0.3
Northern	941	1,682	1,422	0.4	0.3
Eastern	0	0	0	0.0	0.0
Total	2,274	6,547	5,196	0.5	0.4

a/ Scattered trees on farms

Appendix F

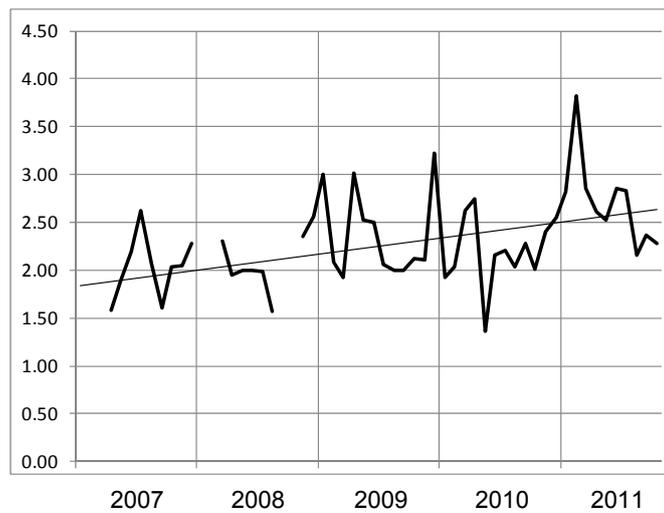
Appendix F Fiji Domestic Market Analysis

- Figure F-1: Domestic market price of Jackfruit, FJD per kg
- Figure F-2: Monthly average price of Jackfruit, FJD per kg
- Figure F-3: Domestic market price of Pineapples
- Figure F-4: Monthly average price of Pineapples, FJD per kg
- Figure F-5: Domestic market price of Chilli, FJD per kg
- Figure F-6: Monthly average price of Chilli, FJD per kg
- Figure F-7: Domestic market price of Eggplant, FJD per kg
- Figure F-8: Monthly average price of Eggplant, FJD per kg
- Figure F-9: Domestic market price of Bitter Gourd, FJD per kg
- Figure F-10: Monthly average price of Bitter Gourd, FJD per kg
- Figure F-11: Domestic market price of Okra, FJD per kg
- Figure F-12: Monthly average price of Okra, FJD per kg

F.1 Domestic Market Prices for Selected Items

Figure F-1 Domestic market price of Jackfruit, FJD per kg

Jackfruit prices are not always reported, indicating that it is sometimes not available in the market. When available, prices are mostly in the FJD2.00–FJD2.50 per kg range.



Appendix F

Figure F-2 Monthly average price of Jackfruit, FJD per kg

Jackfruit prices tend to be higher between June and September.

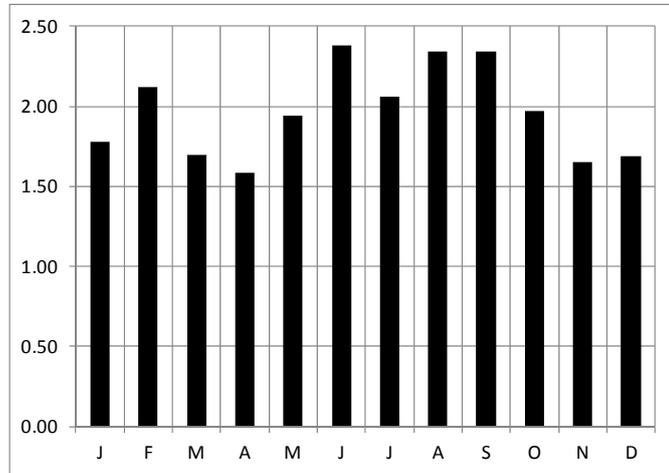


Figure F-3 Domestic market price of Pineapples, FJD per kg

Pineapples generally trade in a narrow price band of FJD1.50 to FJD2.00 per kg

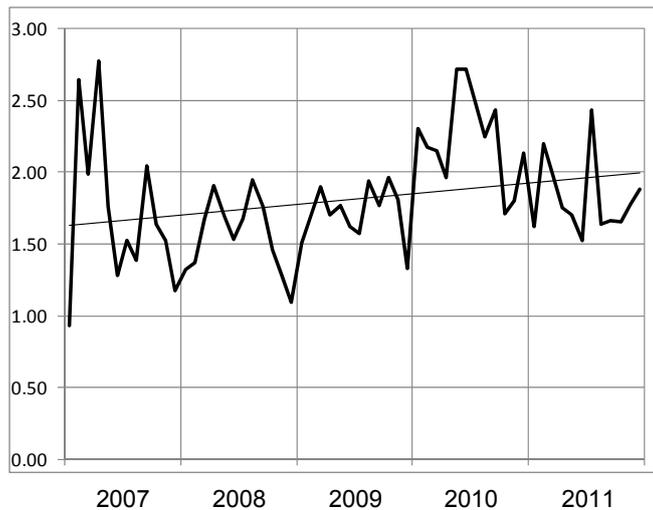
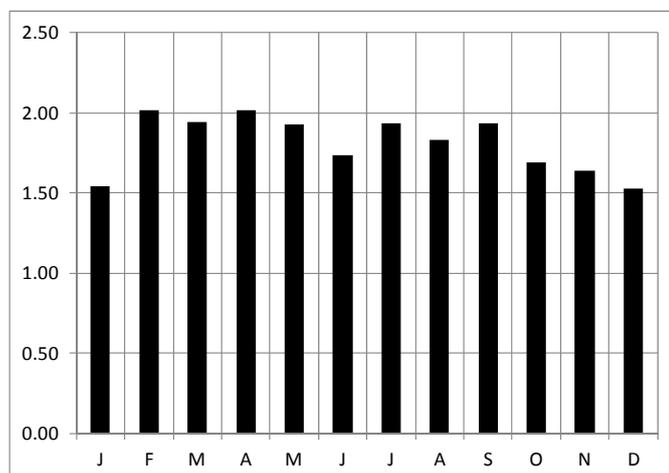


Figure F-4 Monthly average price of Pineapples, FJD per kg

Local pineapples tend to be more abundant and cheaper in November–December–January



Appendix F

Figure F-5 Domestic market price of Chilli, FJD per kg

The prices of bongo (habanero) chillies and mild types tend to move together. Prices mostly fluctuate in the FJD4.00 to FJD8.00 range and there is a general uptrend.

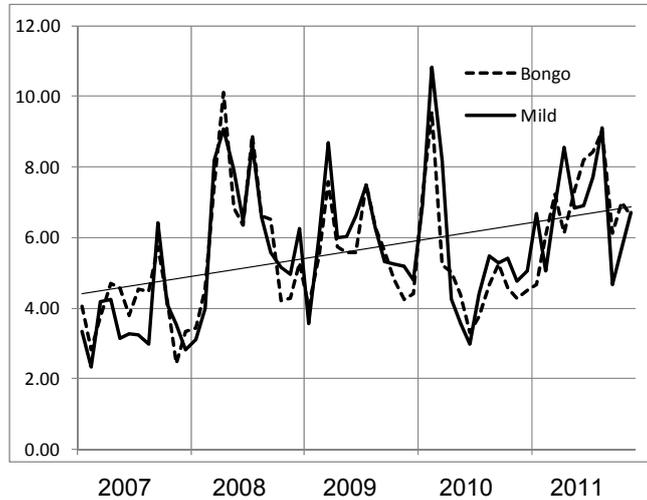


Figure F-6 Monthly average price of Chilli, FJD per kg

Chilli prices do not vary greatly within the year but tend to be lower in May–June and from September until January.

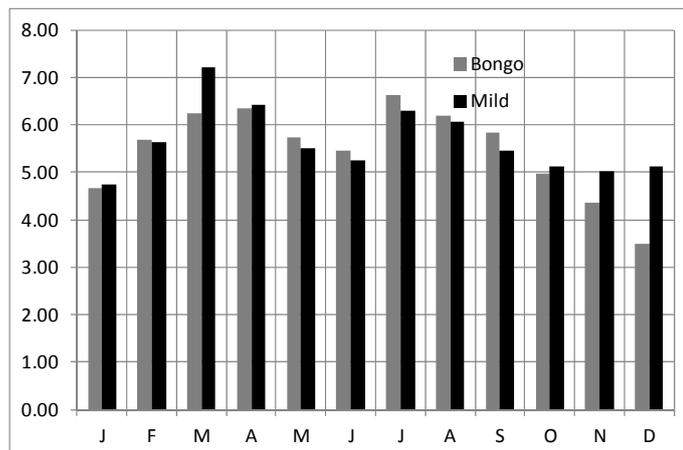
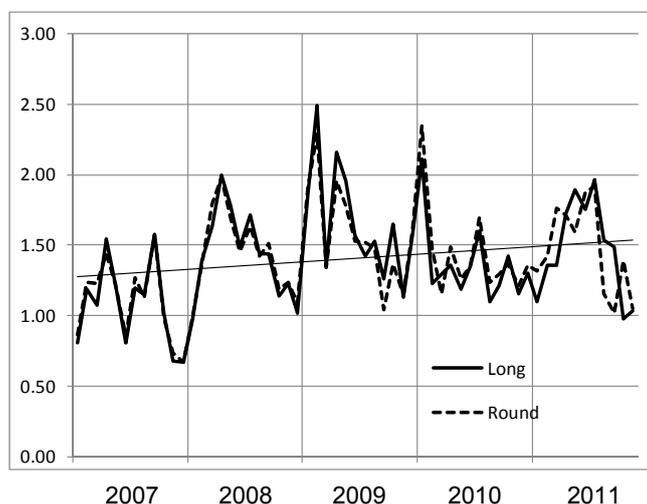


Figure F-7 Domestic market price of Eggplant, FJD per kg

Prices of the two main eggplant varieties tend to move together. Prices are usually between FJD1.00 and FJD1.50 per kg but sometimes spike higher.



Appendix F

Figure F-8 Monthly average price of Eggplant, FJD per kg

Eggplant prices follow a consistent seasonal pattern, with prices in the second half of the year being significantly lower.

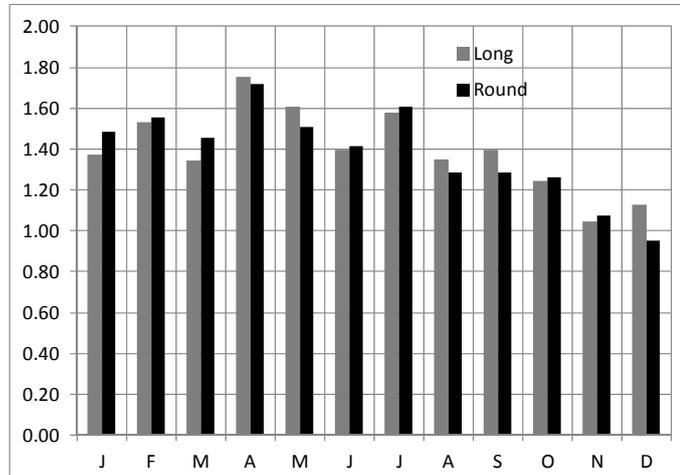


Figure F-9 Domestic market price of Bitter Gourd, FJD per kg

Bitter gourd prices are usually between FJD2.00 and FJD3.00 per kg.

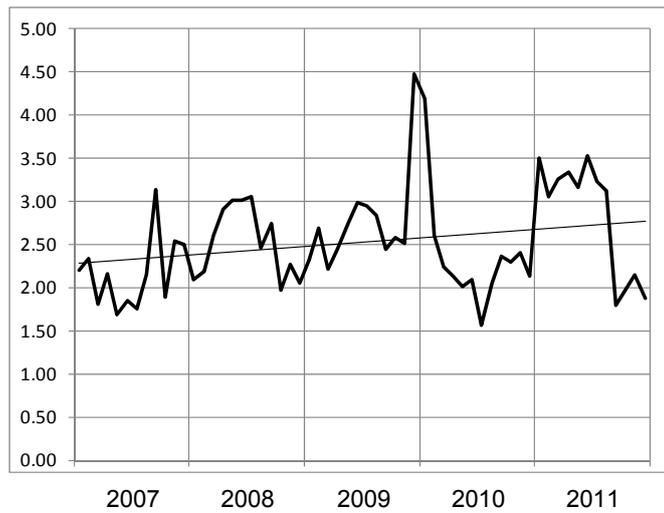
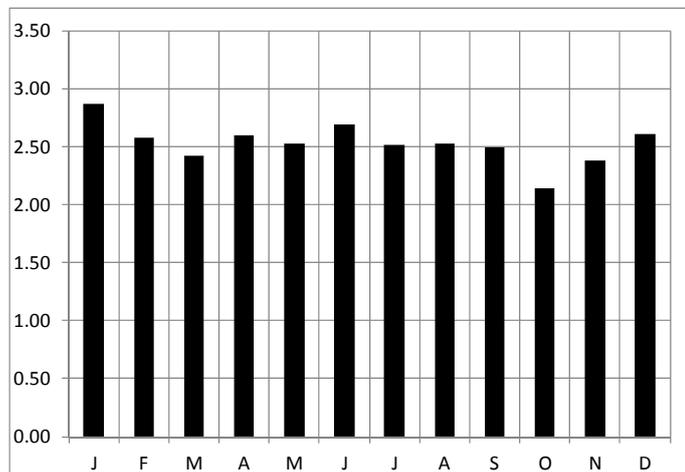


Figure F-10 Monthly average price of Bitter Gourd, FJD per kg

There is no distinct seasonal pattern in prices of bitter gourd.



Appendix F

Figure F-11 Domestic market price of Okra, FJD per kg

Okra prices fluctuate quite widely either side of FJD2.75 per kg.

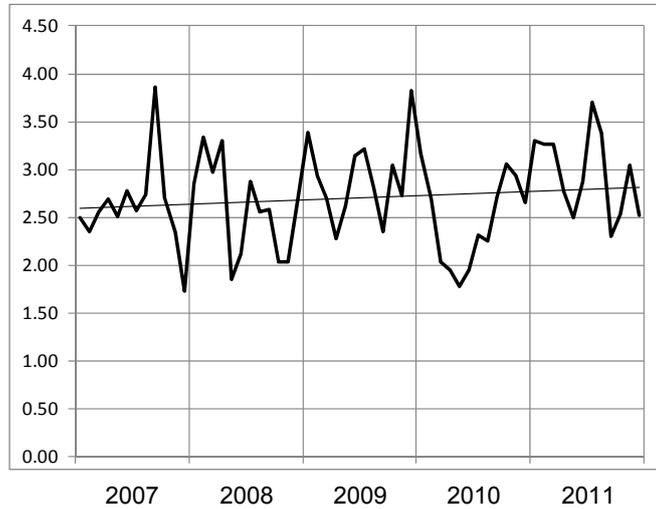
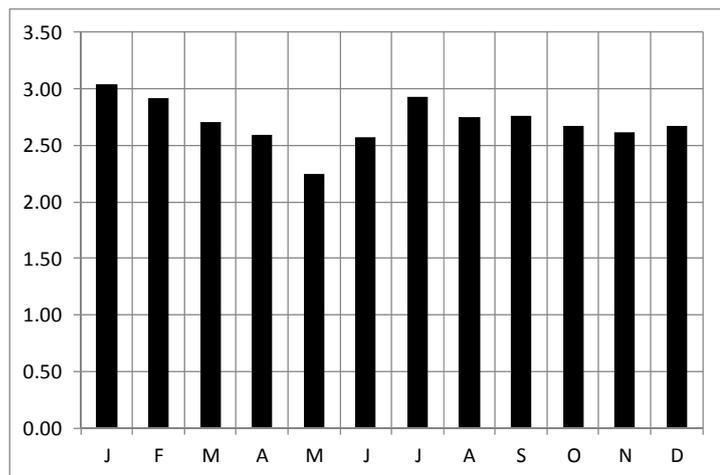


Figure F-12 Monthly average price of Okra, FJD per kg

Okra prices tend to be lower around April–May June, and fairly consistent in other months.



Appendix G

Appendix G Australian Wholesale Market Analysis

Exchange Rates and Price Trends: 2007–2011

Figure G-1: Exchange rate: FJD per AUD, monthly averages

Figure G-2: Inflation in Australia: Quarterly Price Indices

Figure G-3: Index of fruit and vegetable prices in Australia adjusted for the AUD/FJD exchange rate

Jackfruit Wholesale Prices in Sydney: 2007–2011

Figure G-4: Jackfruit prices in Sydney: AUD per kg

Figure G-5: Jackfruit prices in Sydney: FJD per kg

Figure G-6: Monthly average prices for Jackfruit in Sydney: AUD per kg

Pineapple Wholesale Prices in Brisbane: 2007–2011

Figure G-7: Pineapple prices in Brisbane: AUD per carton

Figure G-8: Pineapple prices in Brisbane: FJD per carton

Figure G-9: Monthly average prices for Pineapple in Brisbane: AUD per carton

Figure G-10: Monthly volume of Pineapples traded in Brisbane market (tonnes)

Figure G-11: Percentage price premiums for Rough Leaf Pineapples: Brisbane market

Pineapple Wholesale Prices in Sydney: 2007–2011

Figure G-12: Pineapple prices in Sydney: AUD per carton

Figure G-13: Pineapple prices in Sydney: FJD per carton

Figure G-14: Monthly average prices for Pineapple in Sydney: AUD per carton

Pineapple Wholesale Prices in Melbourne: 2007–2011

Figure G-15: Pineapple prices in Melbourne: AUD per carton

Figure G-16: Pineapple prices in Melbourne: FJD per carton

Figure G-17: Monthly average prices for Pineapple in Melbourne: AUD per carton

Chilli Wholesale Prices in Brisbane: 2007–2011

Figure G-18: Chilli prices in Brisbane: AUD per kg, average of all varieties

Figure G-19: Chilli prices in Brisbane: FJD per kg, average of all varieties

Figure G-20: Monthly average prices for Chilli in Brisbane: AUD per kg, average of all varieties

Figure G-21: Monthly volume of Chilli traded in Brisbane market (tonnes)

Figure G-22: Prices (AUD per kg) paid for Birdseye Red Chillies compared to other varieties

Chilli Wholesale Prices in Sydney: 2007–2011

Figure G-23: Chilli prices in Sydney: AUD per kg, average of all varieties

Figure G-24: Chilli prices in Sydney: FJD per kg, average of all varieties

Figure G-25: Monthly average prices for Chilli in Sydney: AUD per kg, average of all varieties

Chilli Wholesale Prices in Melbourne: 2007–2011

Figure G-26: Chilli prices in Melbourne: AUD per kg, average of all varieties

Figure G-27: Chilli prices in Melbourne: FJD per kg, average of all varieties

Figure G-28: Monthly average prices for Chilli in Melbourne: AUD per kg, average of all varieties

Eggplant Wholesale Prices in Brisbane: 2007–2011

Figure G-29: Eggplant prices in Brisbane: AUD per L of carton volume, average of all varieties

Figure G-30: Eggplant prices in Brisbane: FJD per L of carton volume, average of all varieties

Figure G-31: Monthly average prices for Eggplant in Brisbane: AUD per L of carton volume, average of all varieties

Figure G-32: Monthly volume of Eggplant traded in Brisbane market (tonnes)

Appendix G

Eggplant Wholesale Prices in Sydney: 2007–2011

Figure G-33: Eggplant prices in Sydney: AUD per L of carton volume, average of all varieties

Figure G-34: Eggplant prices in Sydney: FJD per L of carton volume, average of all varieties

Figure G-35: Monthly average prices for Eggplant in Sydney: AUD per L of carton volume, average of all varieties

Eggplant Wholesale Prices in Melbourne: 2007–2011

Figure G-36: Eggplant prices in Melbourne: AUD per L of carton volume, average of all varieties

Figure G-37: Eggplant prices in Melbourne: FJD per L of carton volume, average of all varieties

Figure G-38: Monthly average prices for Eggplant in Melbourne: AUD per L of carton volume, average of all varieties

Okra Wholesale Prices in Brisbane: 2007–2011

Figure G-39: Okra prices in Brisbane: AUD per kg

Figure G-40: Okra prices in Brisbane: FJD per kg

Figure G-41: Monthly average prices for Okra in Brisbane: AUD per kg

Figure G-42: Monthly volume of Okra traded in Brisbane market (tonnes)

Okra Wholesale Prices in Sydney: 2007–2011

Figure G-43: Okra prices in Sydney: AUD per kg

Figure G-44: Okra prices in Sydney: FJD per kg

Figure G-45: Monthly average prices for Okra in Sydney: AUD per kg

Okra Wholesale Prices in Melbourne: 2007–2011

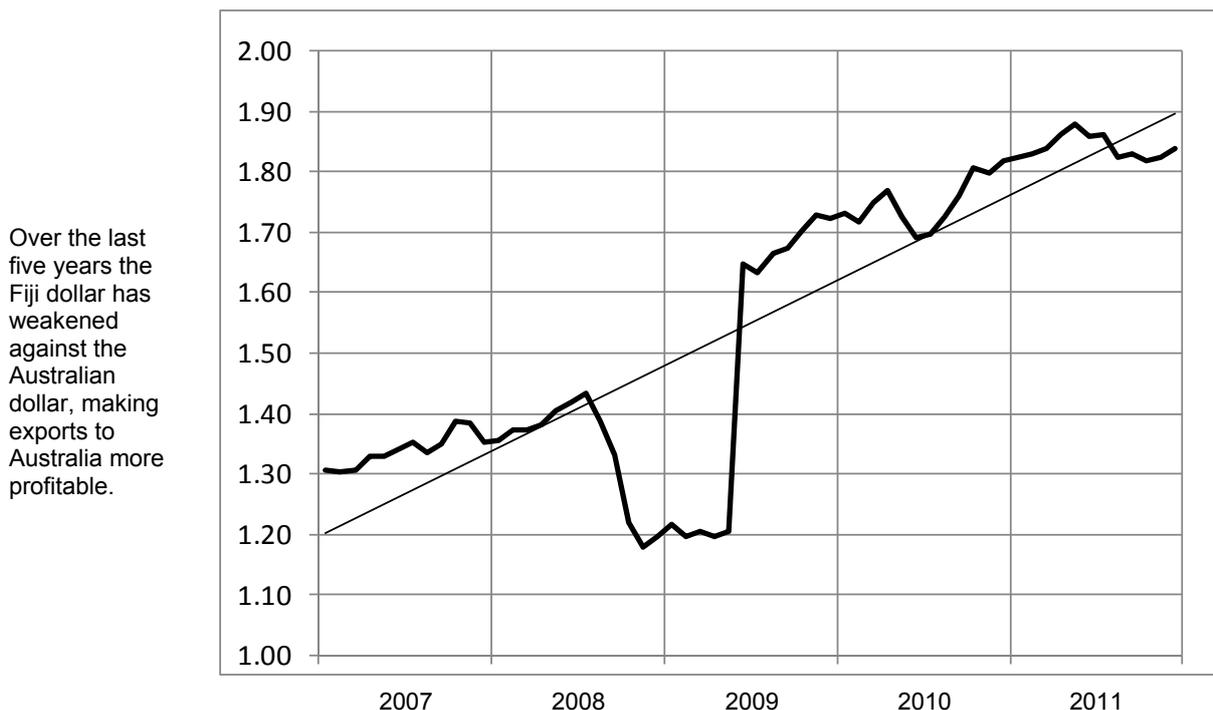
Figure G-46: Okra prices in Melbourne: AUD per kg

Figure G-47: Okra prices in Melbourne: FJD per kg

Figure G-48: Monthly average prices for Okra in Melbourne: AUD per kg

G.1 Exchange Rates and Price Trends: 2007–2011

Figure G-1 Exchange rate: FJD per AUD, monthly averages



Appendix G

Figure G-2 Inflation in Australia: Quarterly Price Indices

Over the last five years food price inflation in Australia has been a little above the general inflation rate. Fruit and vegetable prices are more volatile than the food prices overall. There was a major price spike in fruit and vegetables in 2011, mainly attributable to the Queensland floods.

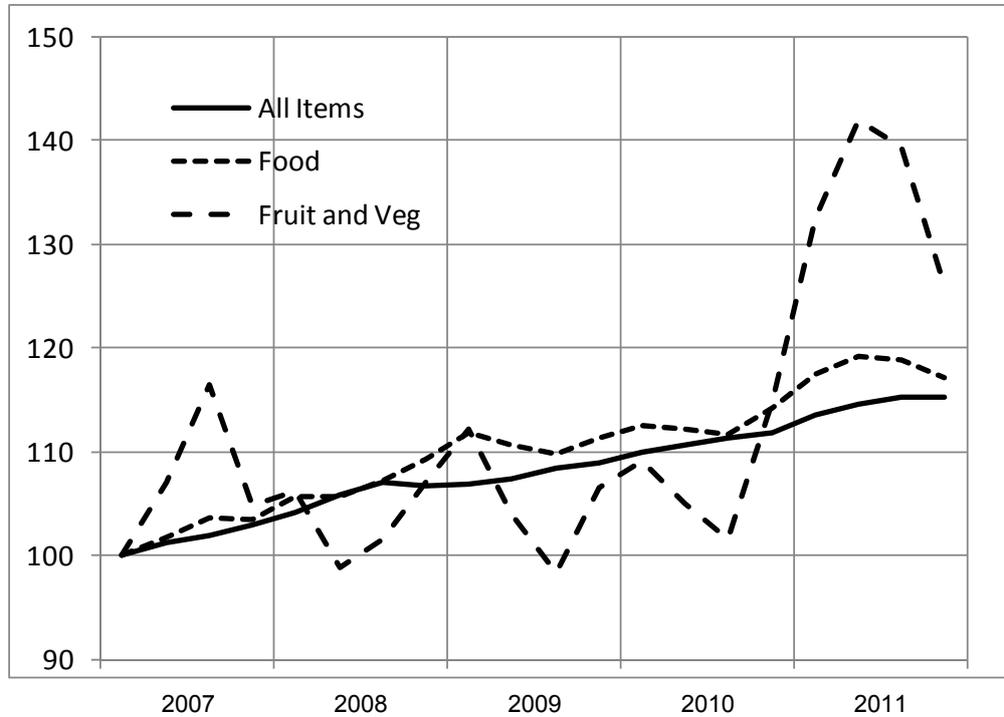
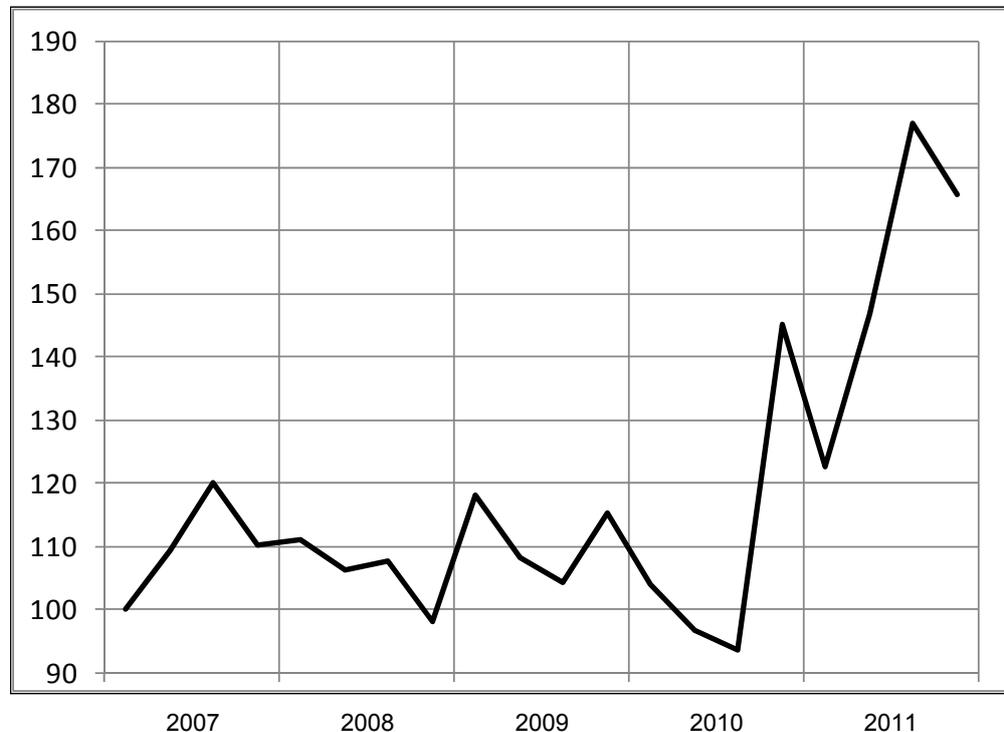


Figure G-3 Index of fruit and vegetable prices in Australia adjusted for the AUD/FJD exchange rate

The combined effect of exchange rate movements and the price spike during 2011 almost doubled the price of fruit and vegetables in Australia expressed in Fiji dollars.



Appendix G

G.2 Jackfruit Wholesale Prices in Sydney: 2007–2011

Figure G-4 Jackfruit prices in Sydney: AUD per kg

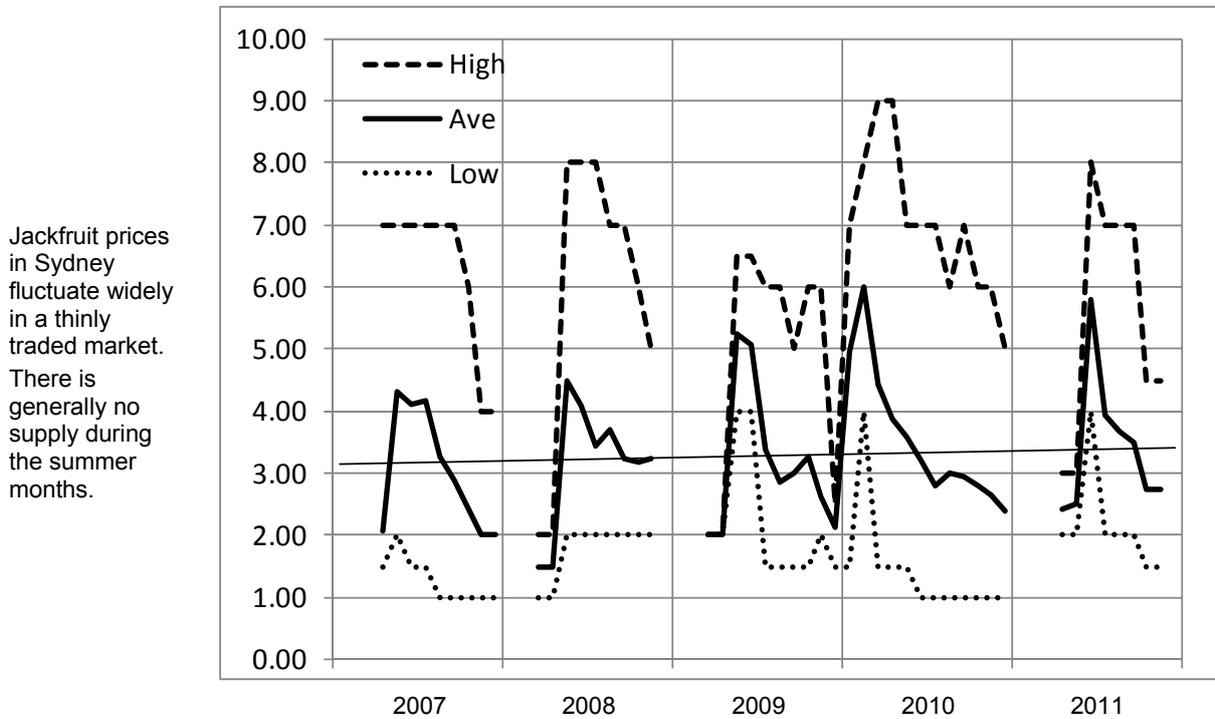
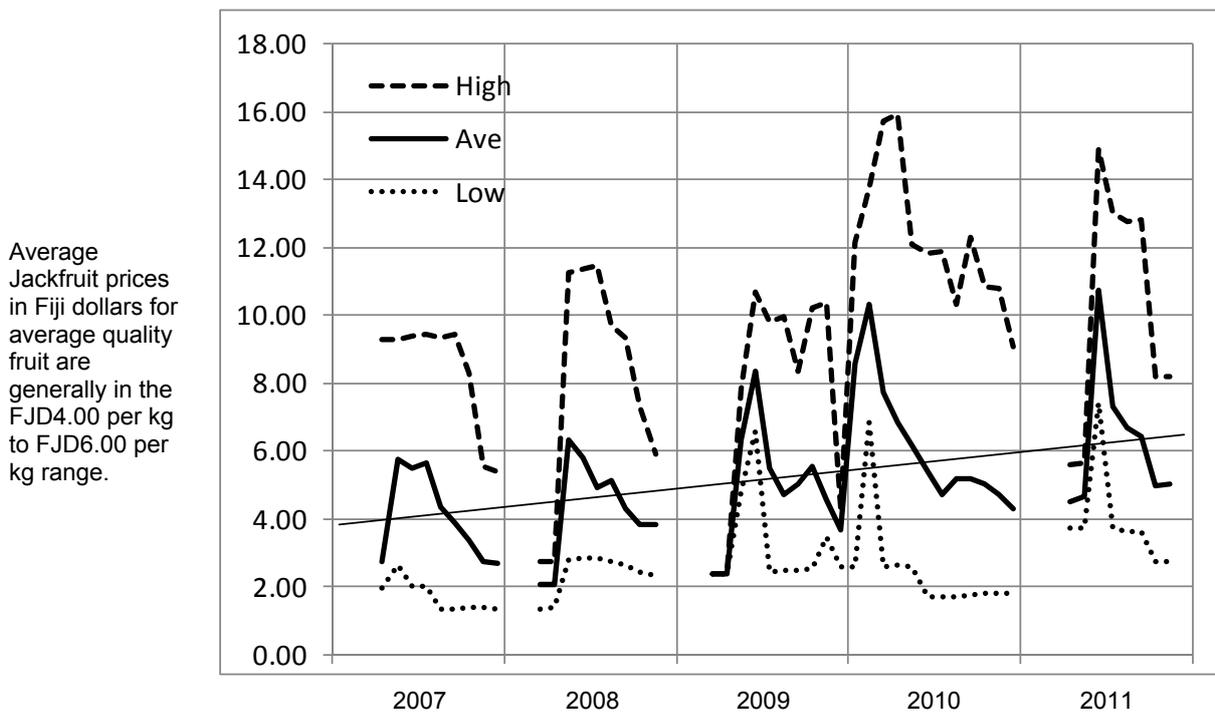
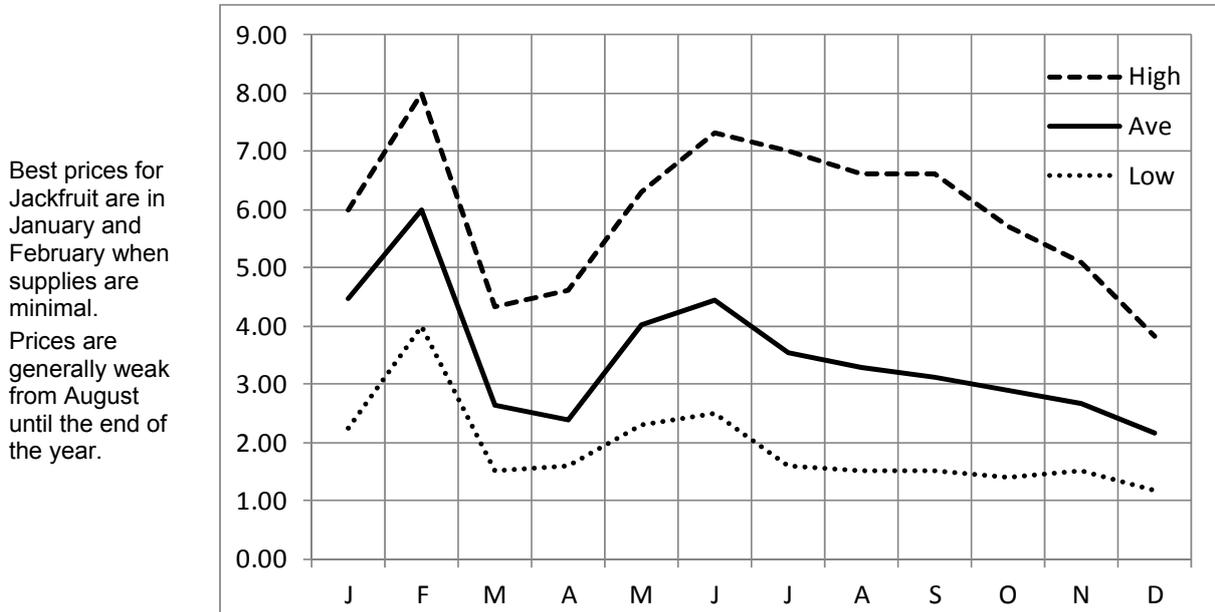


Figure G-5 Jackfruit prices in Sydney: FJD per kg



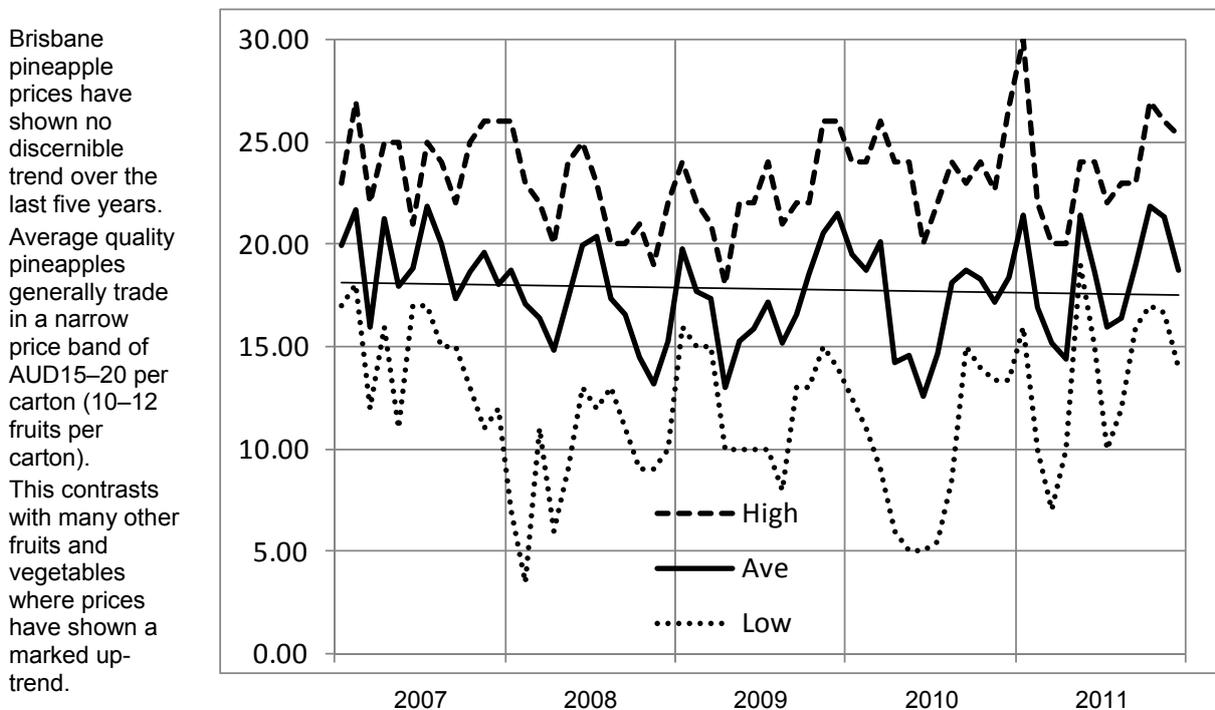
Appendix G

Figure G-6 Monthly average prices for Jackfruit in Sydney: AUD per kg



G.3 Pineapple Wholesale Prices in Brisbane: 2007–2011

Figure G-7 Pineapple prices in Brisbane: AUD per carton



Appendix G

Figure G-8 Pineapple prices in Brisbane: FJD per carton

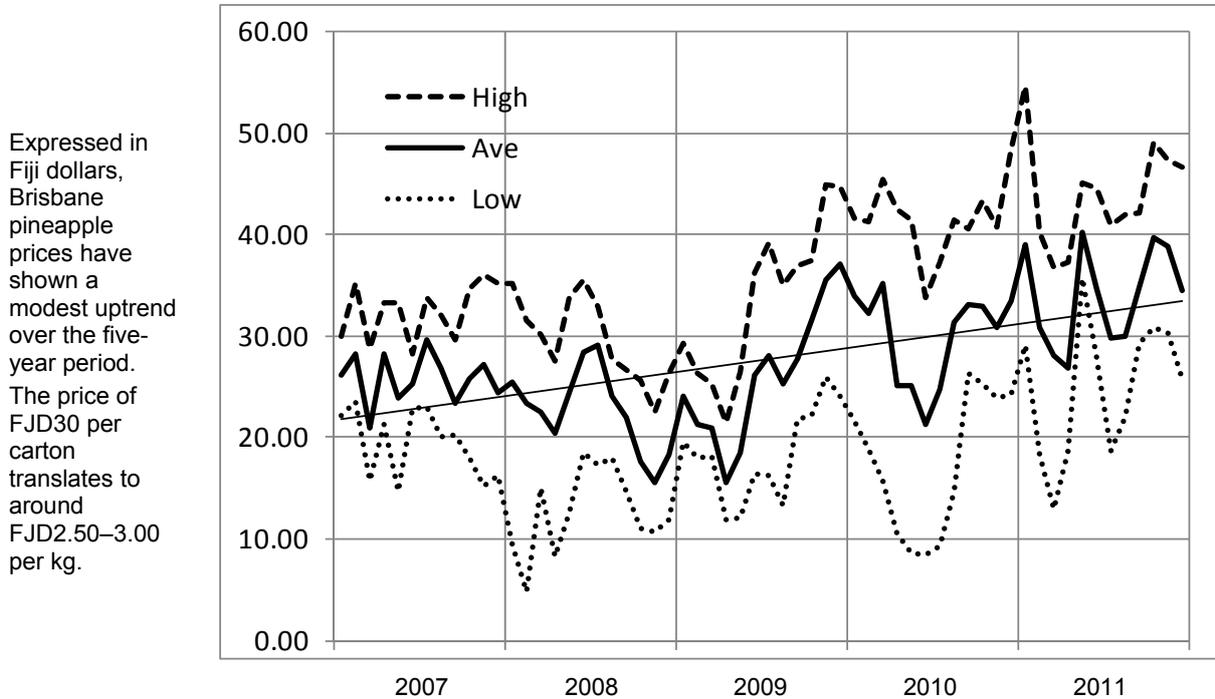
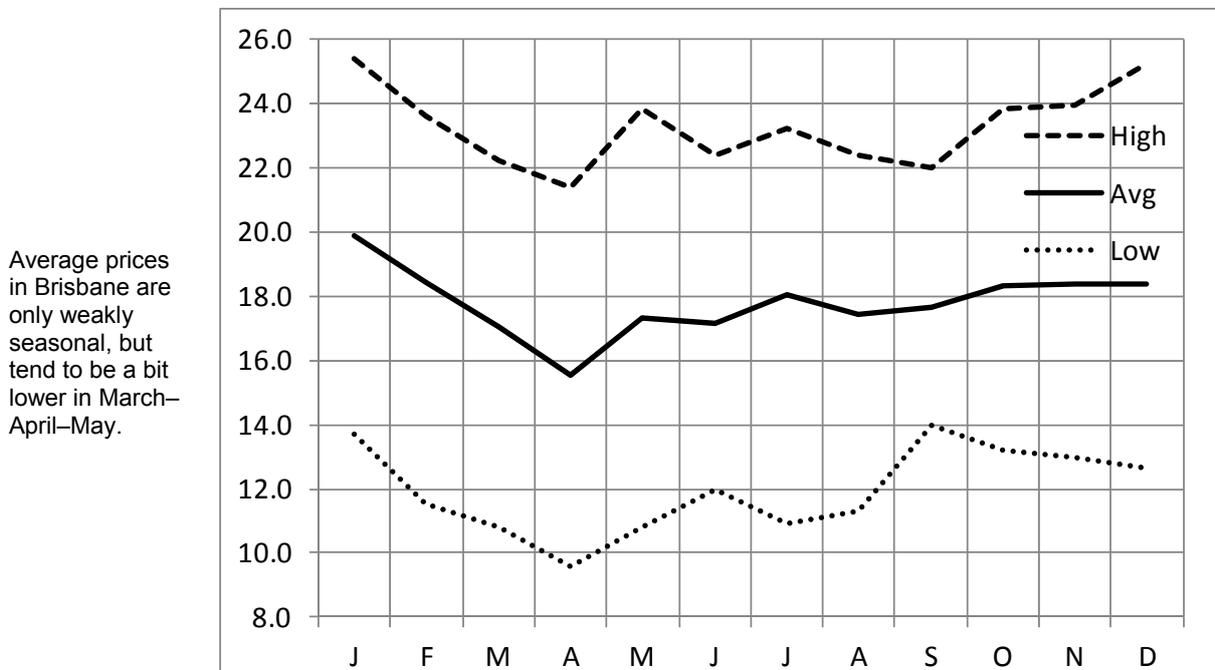


Figure G-9 Monthly average Pineapple prices in Brisbane: AUD per carton



Appendix G

Figure G-10 Monthly volume of Pineapples traded in Brisbane market (tonnes)

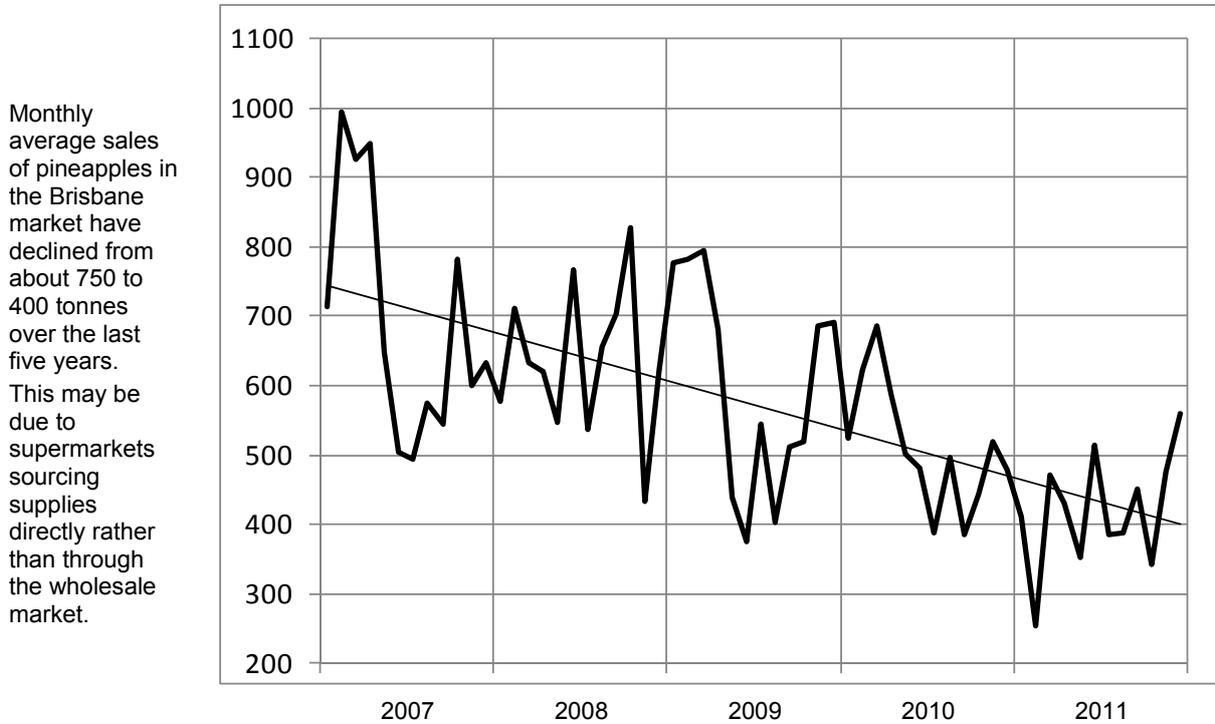
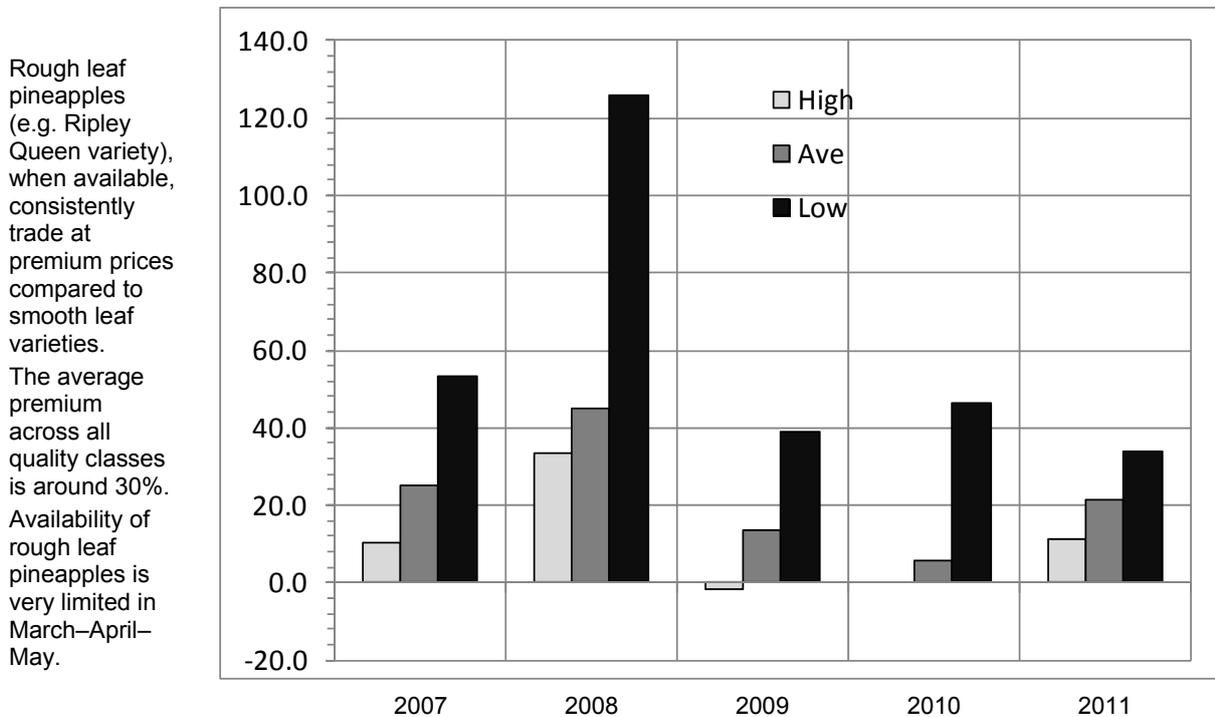


Figure G-11 Percentage price premiums for Rough Leaf Pineapples: Brisbane market



Appendix G

G.4 Pineapple Wholesale Prices in Sydney: 2007–2011

Figure G-12 Pineapple prices in Sydney: AUD per carton

Sydney pineapple prices have been quite stable over the last five years, with average quality fruit trading between AUD15 and AUD20 per carton.

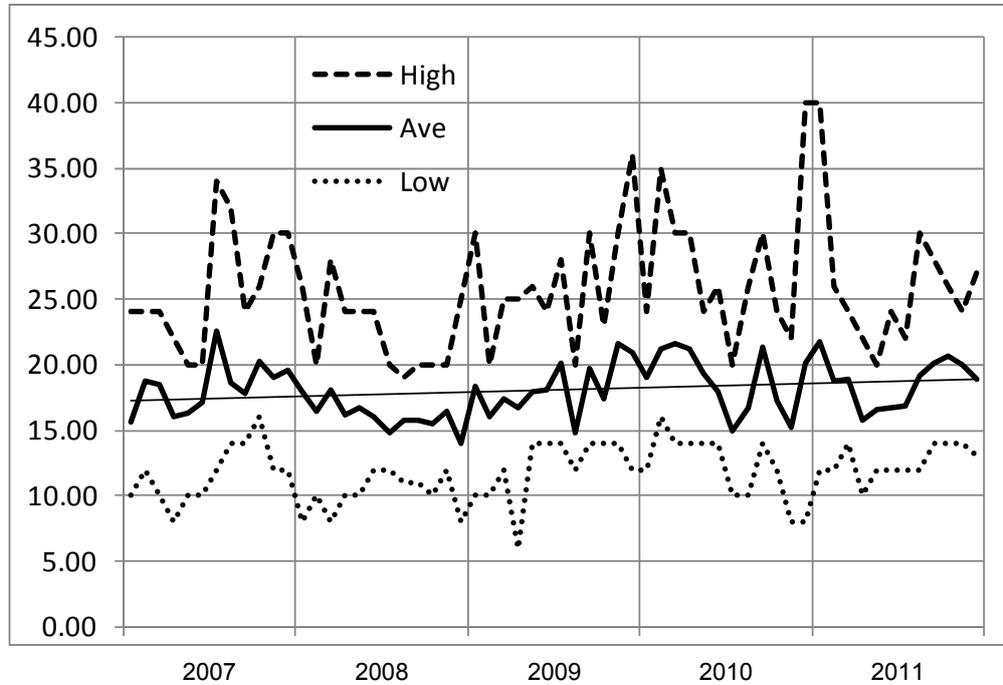
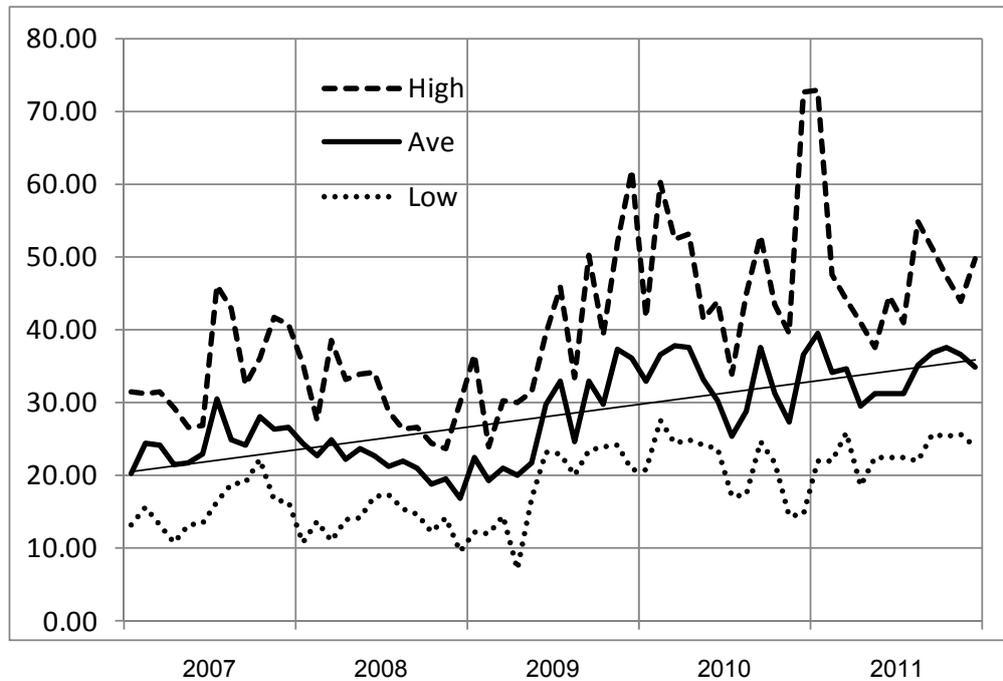


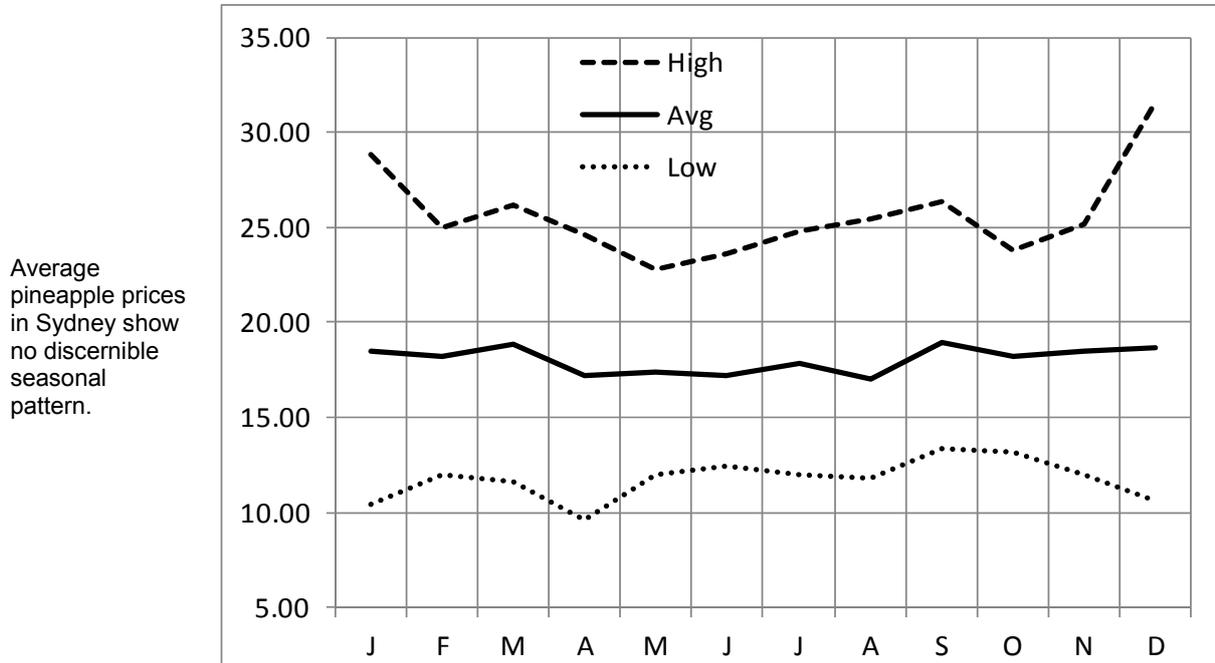
Figure G-13 Pineapple prices in Sydney: FJD per carton

Expressed in Fiji dollars, Sydney pineapple prices have shown a modest uptrend over the five-year period. The price of FJD30 per carton translates to around FJD2.50–3.00 per kg.



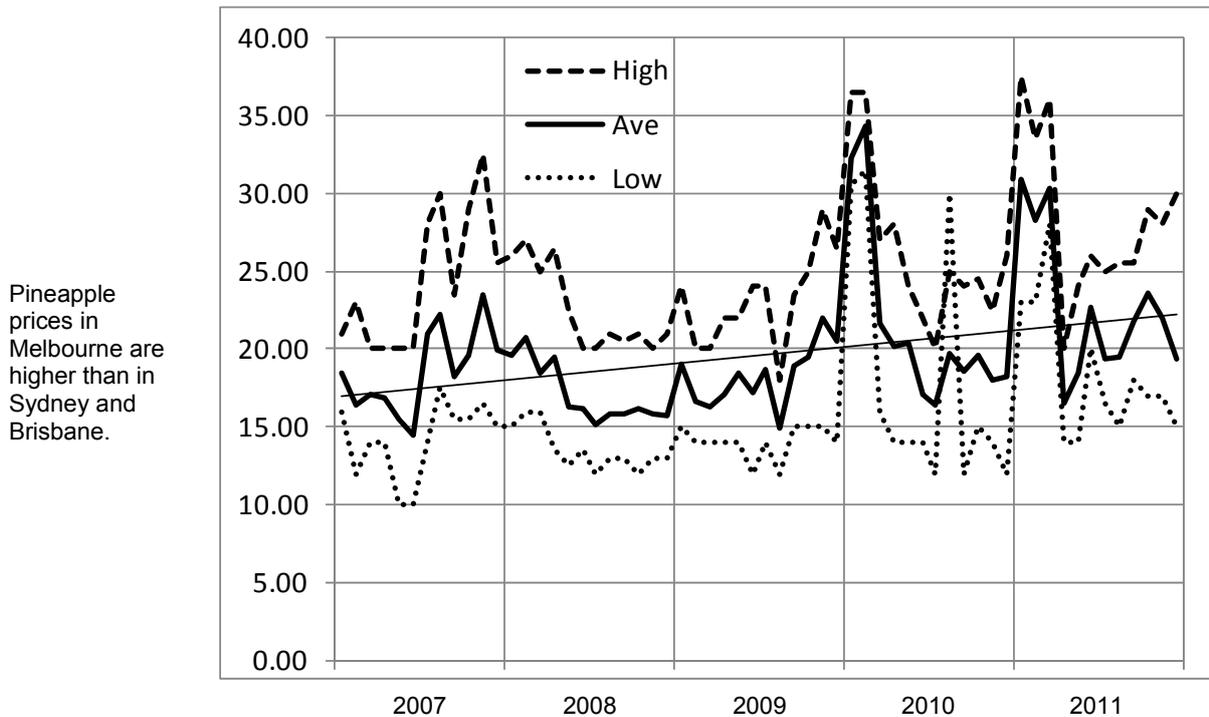
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Figure G-14 Monthly average Pineapple prices in Sydney: AUD per carton



G.5 Pineapple Wholesale Prices in Melbourne: 2007–2011

Figure G-15 Pineapple prices in Melbourne: AUD per carton



Appendix G

Figure G-16 Pineapple prices in Melbourne: FJD per carton

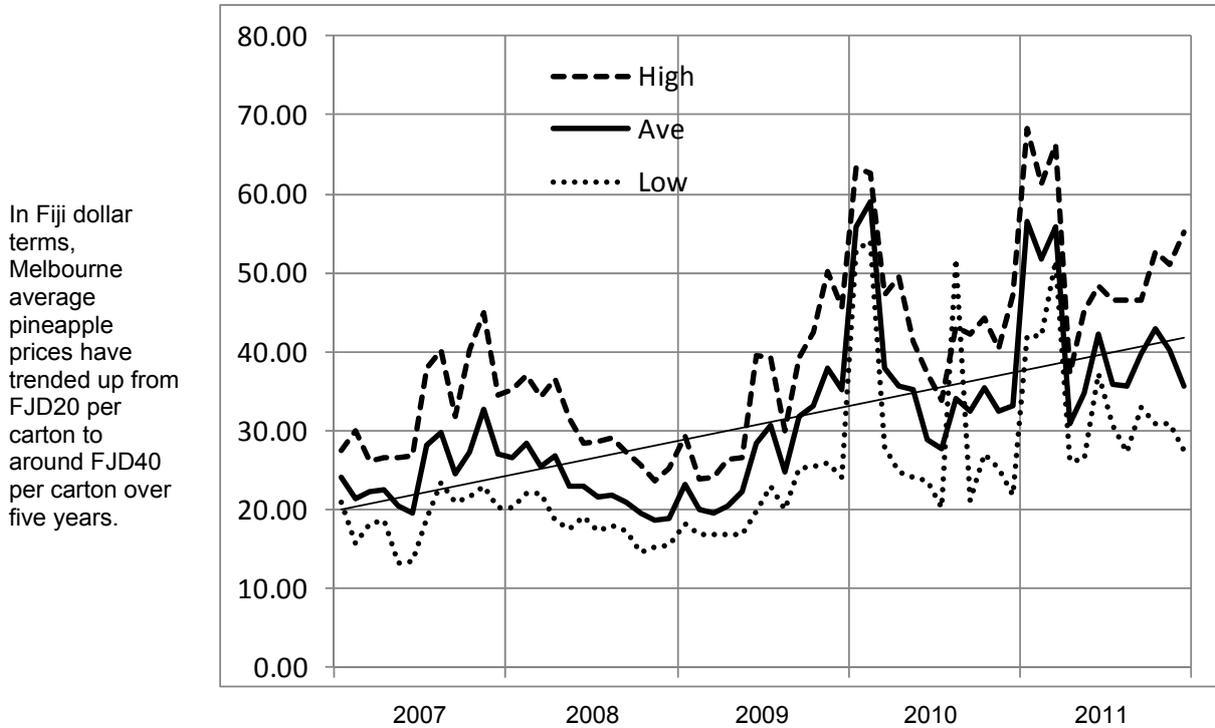
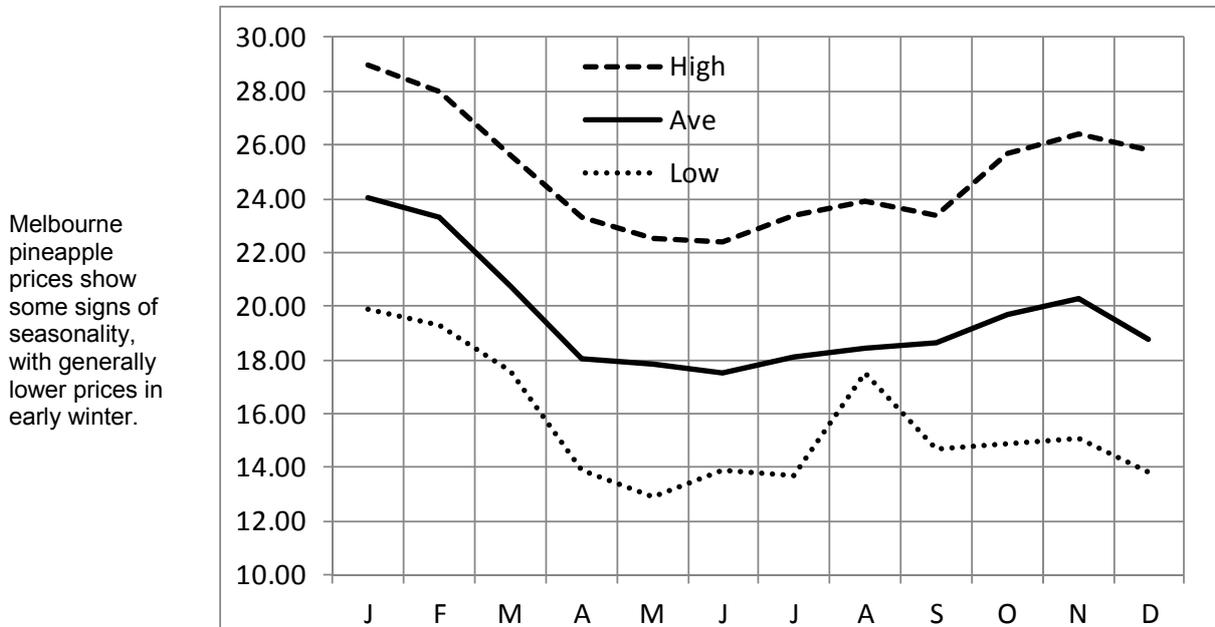


Figure G-17 Monthly average Pineapple prices in Melbourne: AUD per carton



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G.6 Chilli Wholesale Prices in Brisbane: 2007–2011

Figure G-18 Chilli prices in Brisbane: AUD per kg, average of all varieties

Chilli prices have generally been between AUD5 per kg and AUD10 per kg for most of the last five years, except for a marked price spike in 2011 related to the Queensland floods earlier in that year.

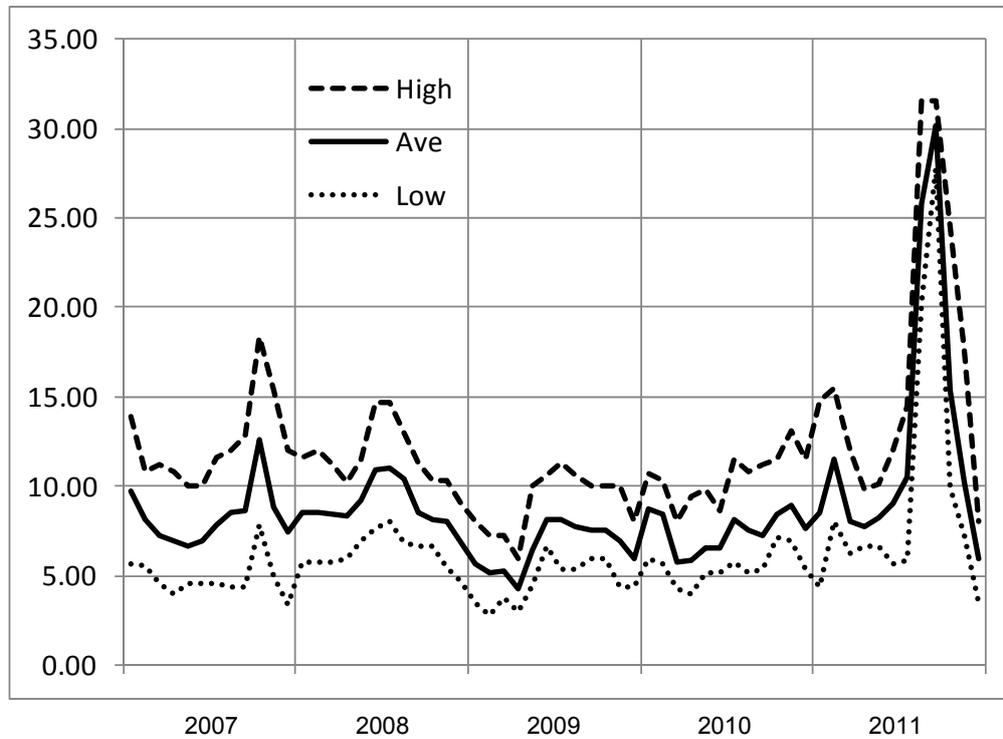
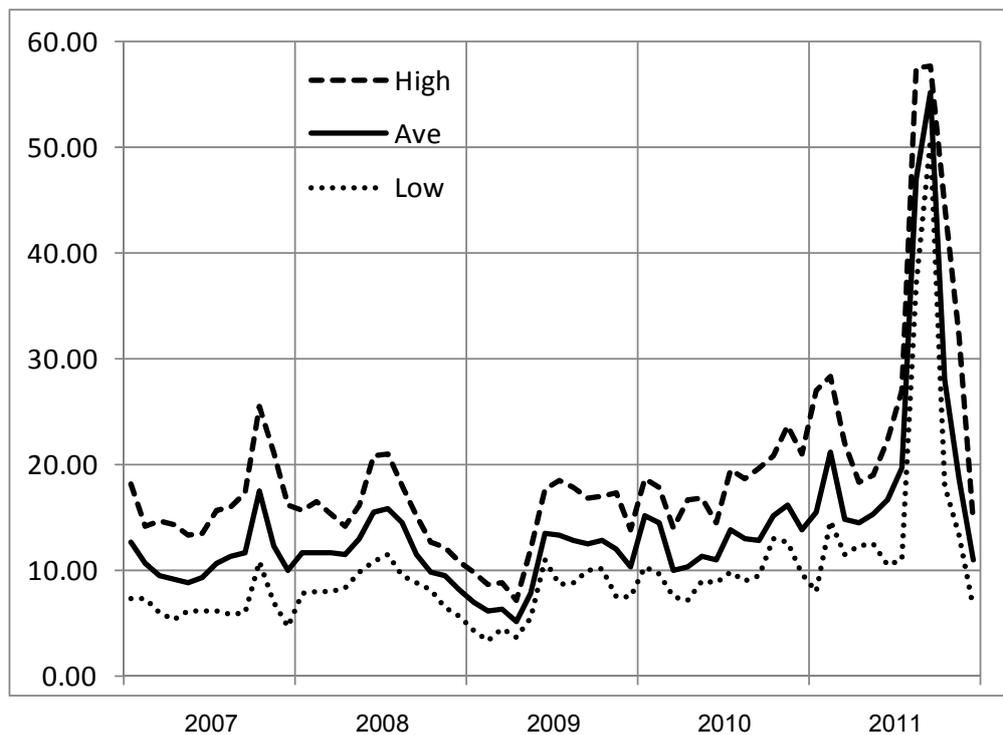


Figure G-19 Chilli prices in Brisbane: FJD per kg, average of all varieties

In Fiji dollar terms, average prices have remained above FJD10 per kg for most of the last five years.



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Figure G-20 Monthly average prices for Chilli in Brisbane: AUD per kg, average of all varieties

There is significant seasonality in Brisbane chilli prices, with below average prices in March–April–May and premium prices in August–September–October.

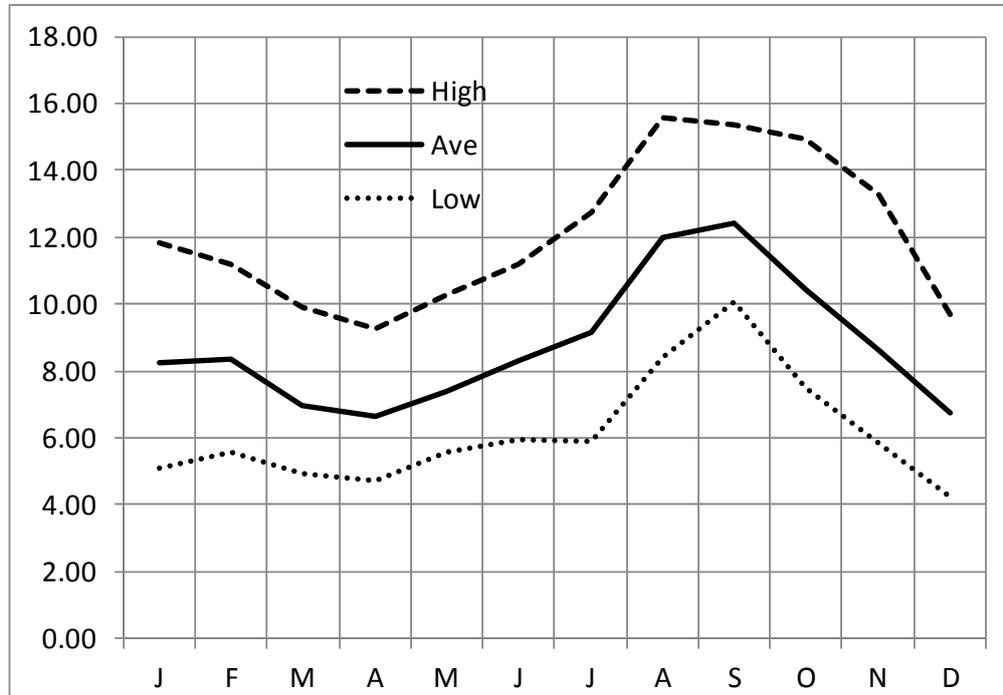
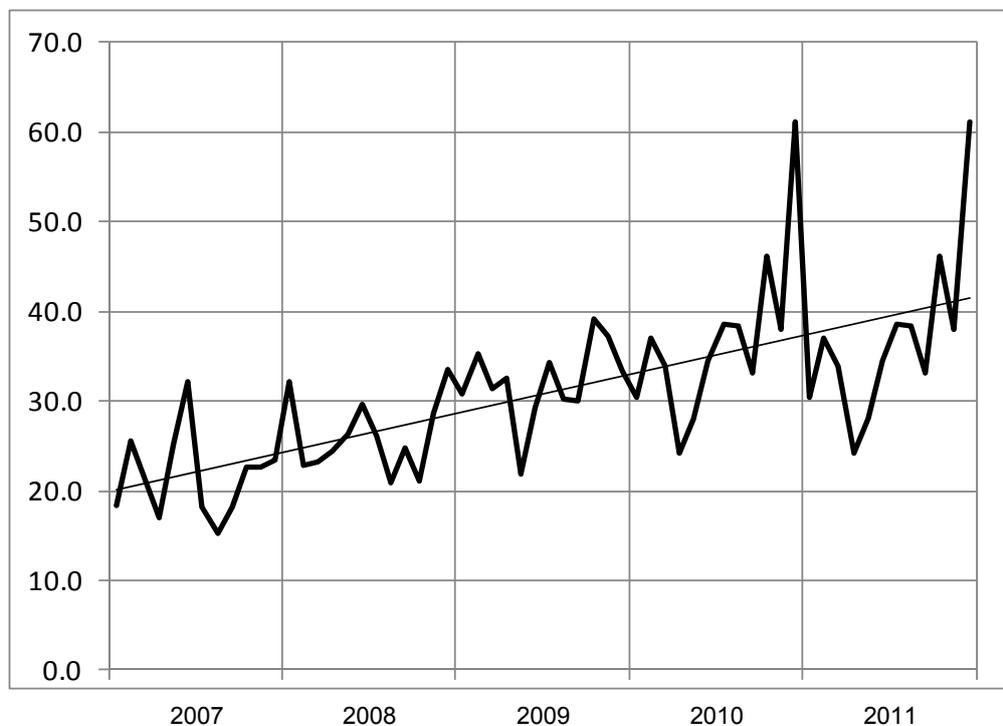


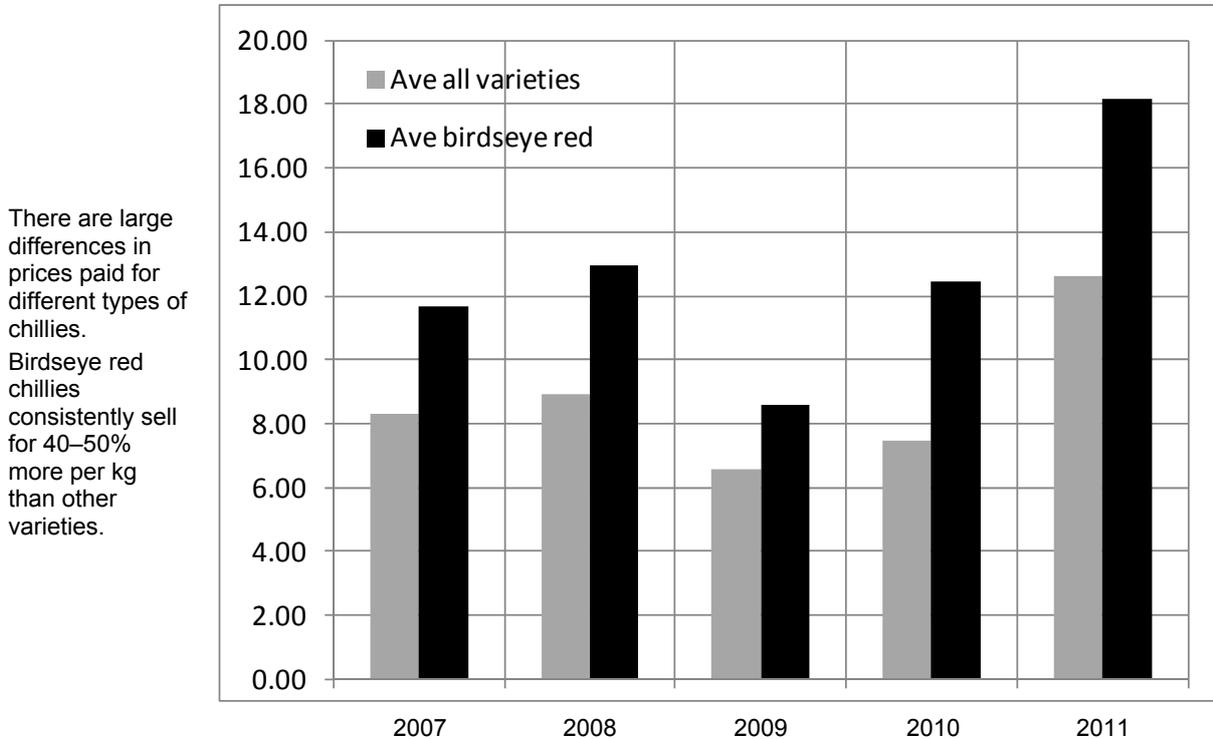
Figure G-21 Monthly volume of Chilli traded in Brisbane market (tonnes)

Monthly average sales of chillies in Brisbane market have doubled during the last five years.



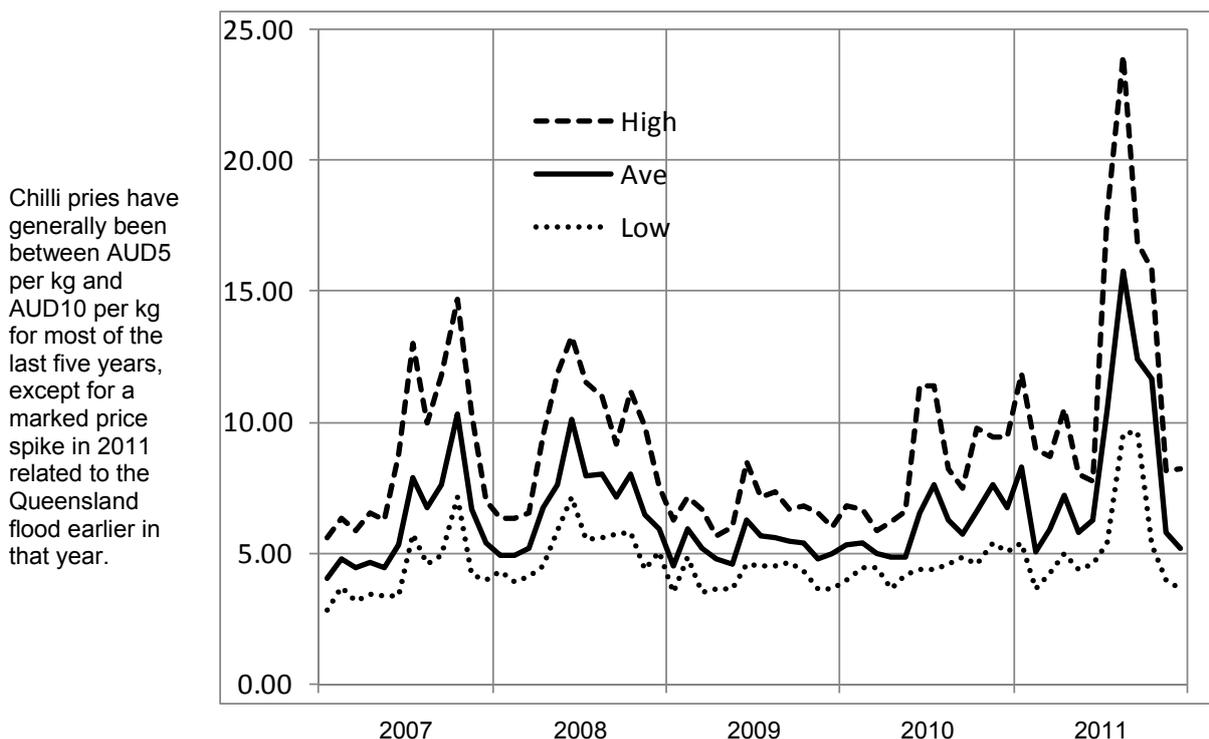
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Figure G-22 Prices (AUD per kg) paid for Birdseye Red Chillies compared to other varieties



G.7 Chilli Wholesale Prices in Sydney 2007–2011

Figure G-23 Chilli prices in Sydney: AUD per kg, average of all varieties



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Figure G-24 Chilli prices in Sydney: FJD per kg, average of all varieties

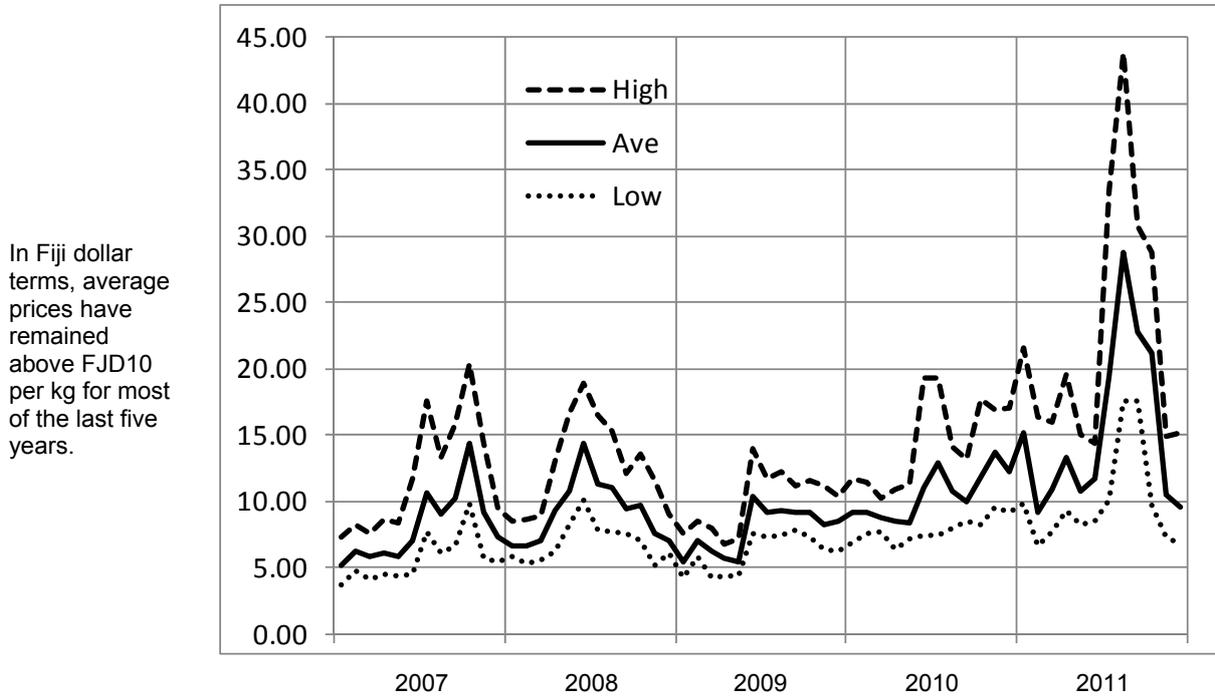
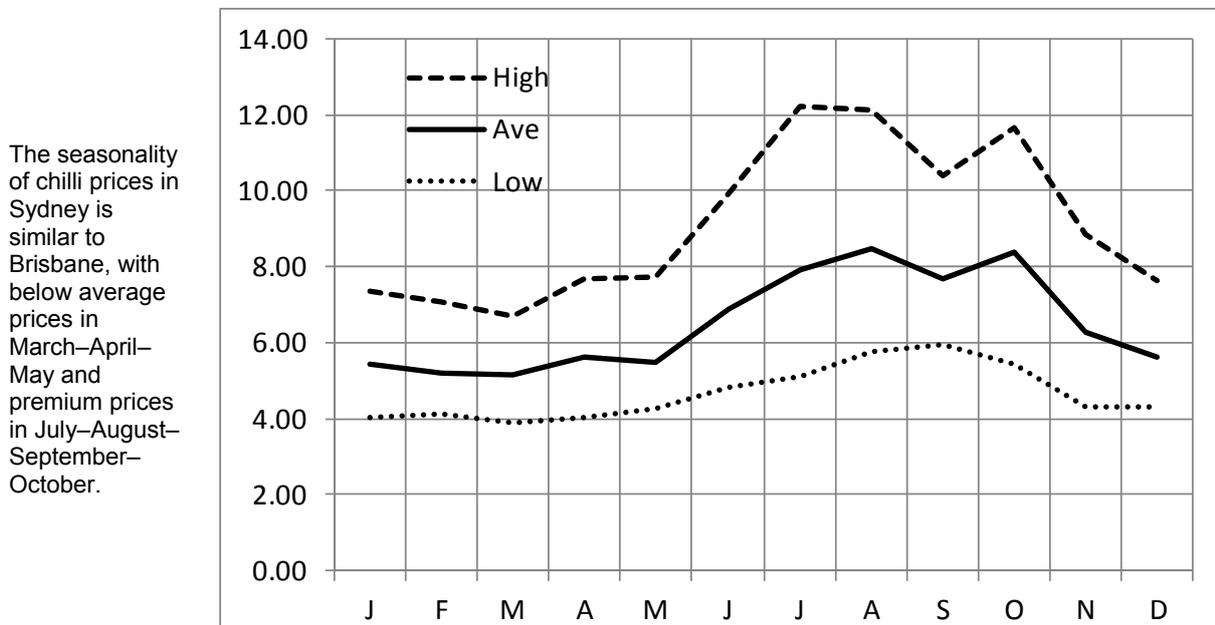


Figure G-25 Monthly average Chilli prices in Sydney: AUD per kg, average of all varieties



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G.8 Chilli Wholesale Prices in Melbourne: 2007–2011

Figure G-26 Chilli prices in Melbourne: AUD per kg, average of all varieties

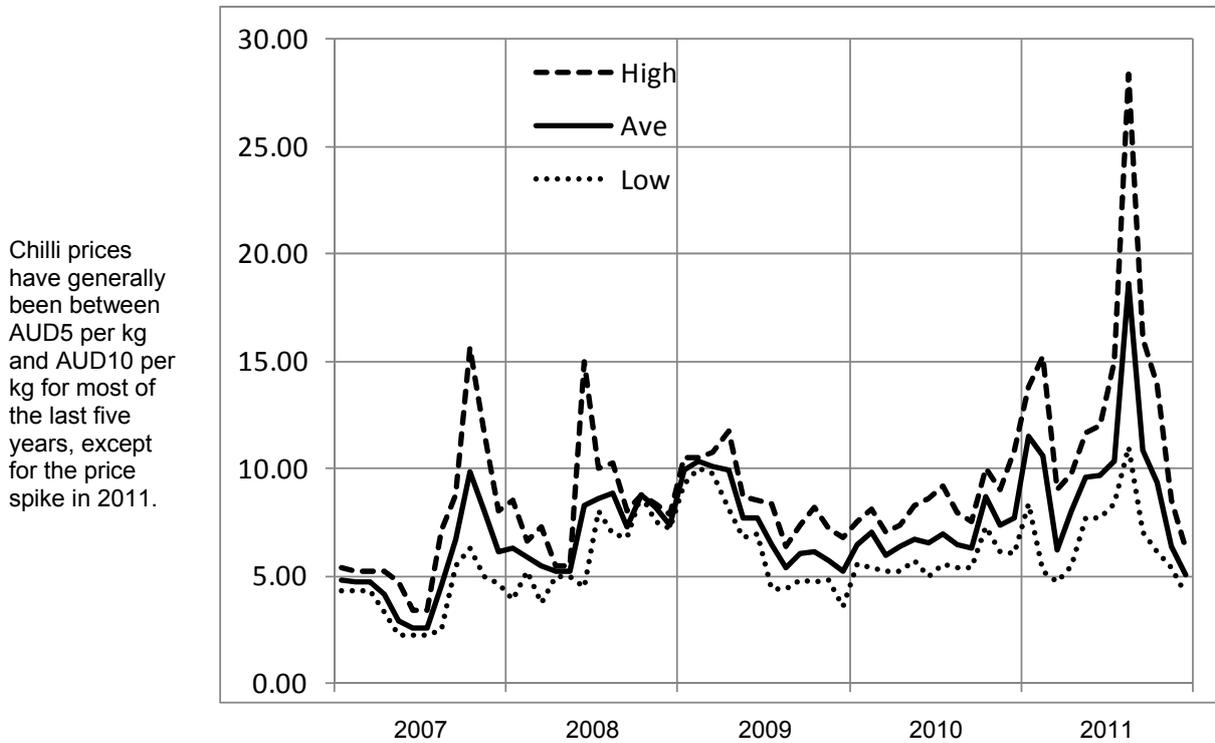
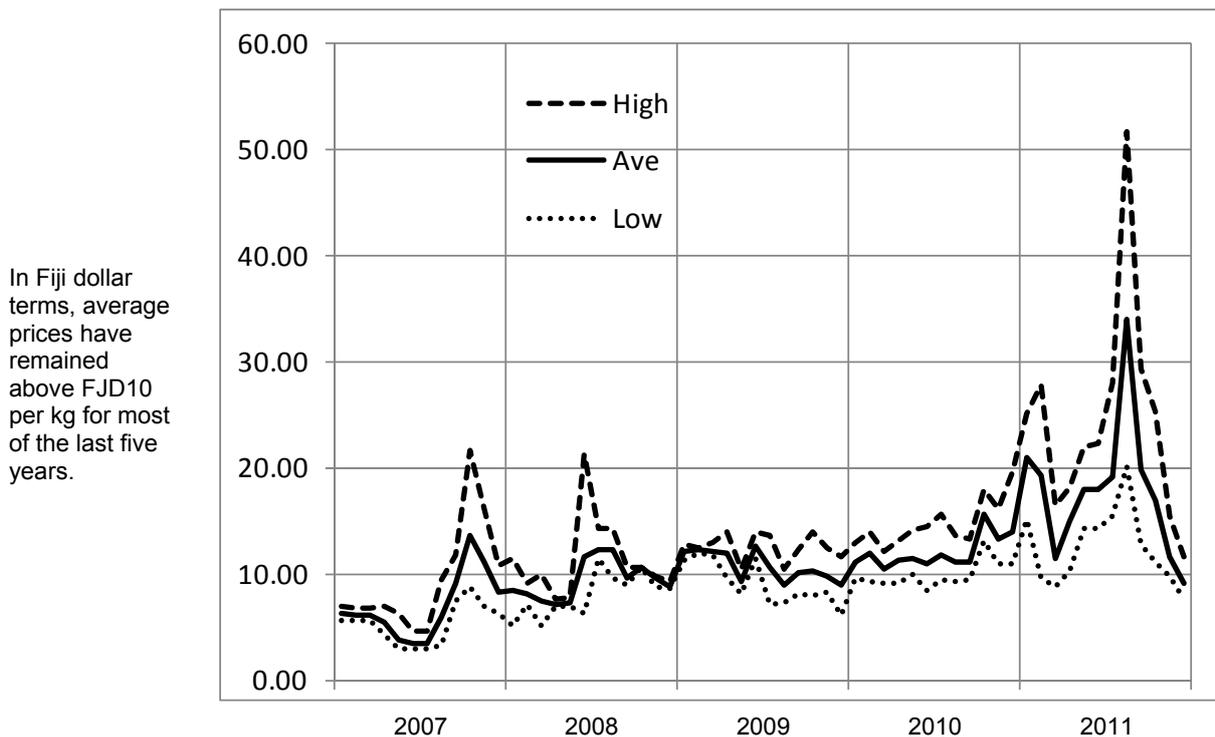
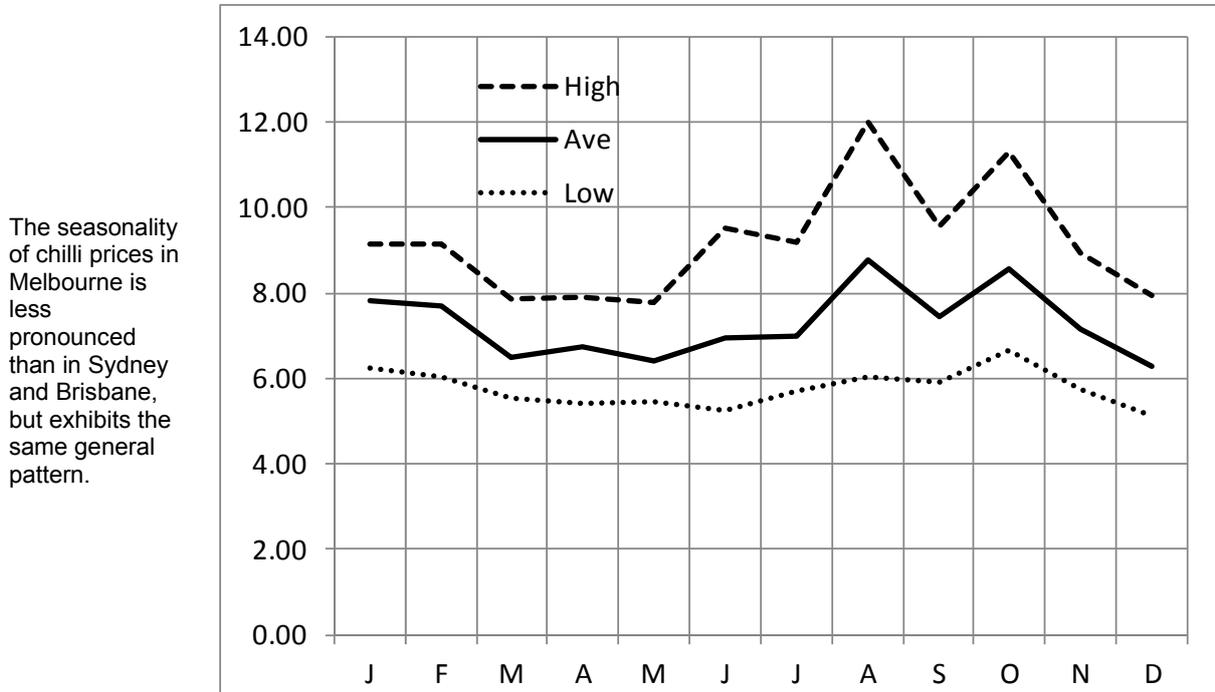


Figure G-27 Chilli prices in Melbourne: FJD per kg, average of all varieties



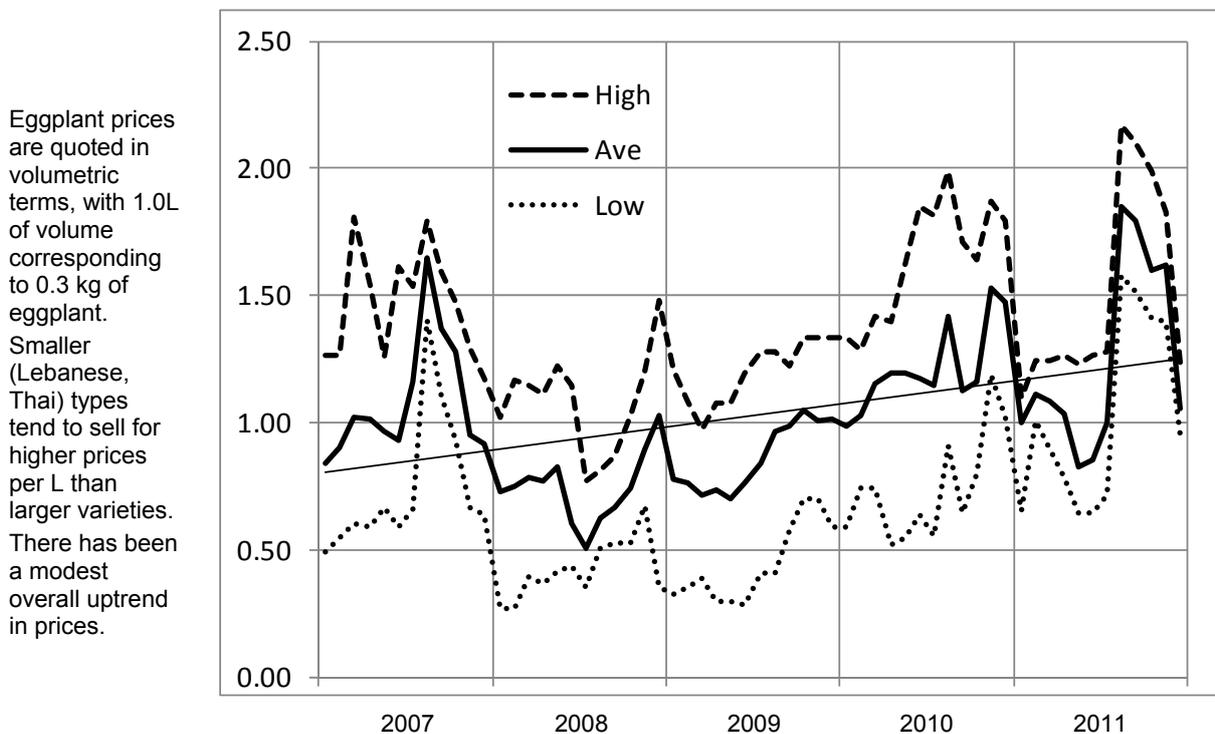
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Figure G-28 Monthly average Chilli prices in Melbourne: AUD per kg, average of all varieties



G.9 Eggplant Wholesale Prices in Brisbane: 2007–2011

Figure G-29 Eggplant prices in Brisbane: AUD per L of carton volume, average of all varieties



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Figure G-30 Eggplant prices in Brisbane: FJD per L of carton volume, average of all varieties

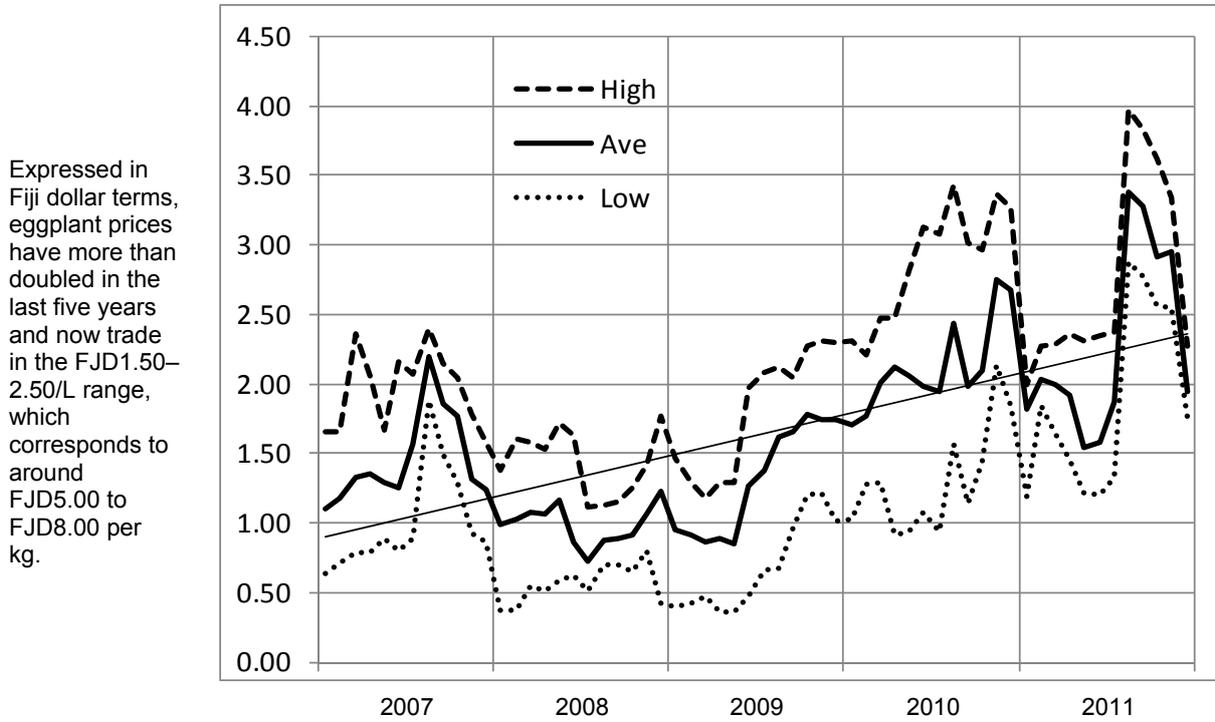
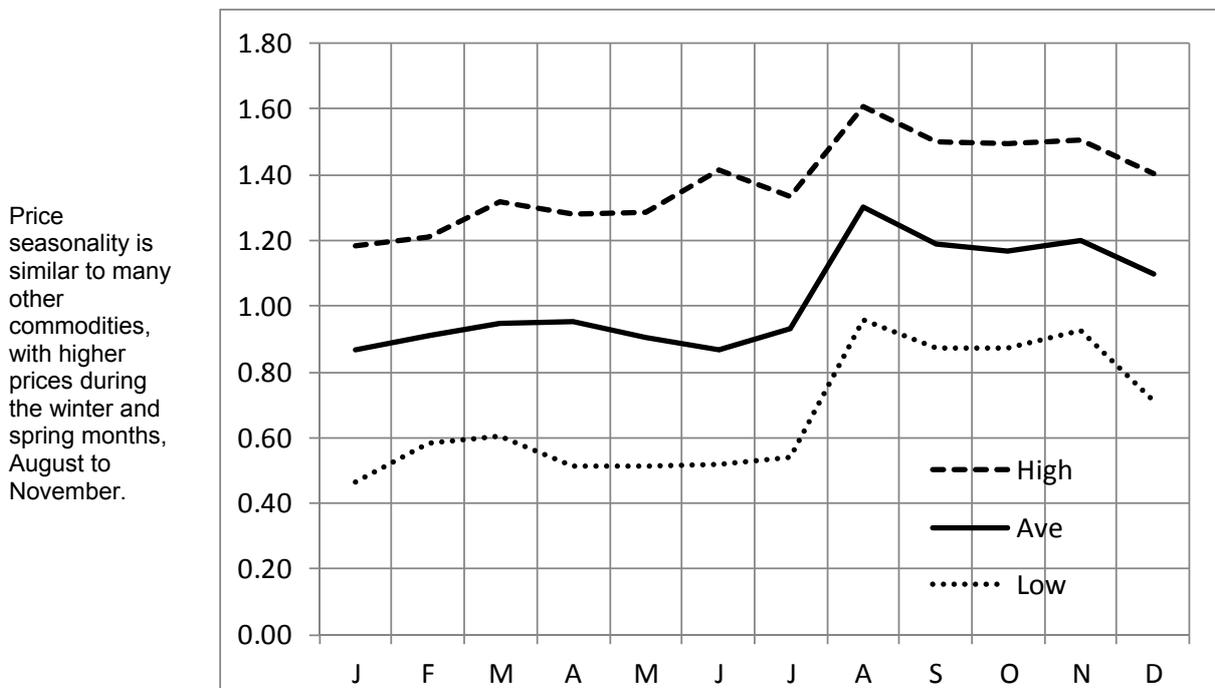
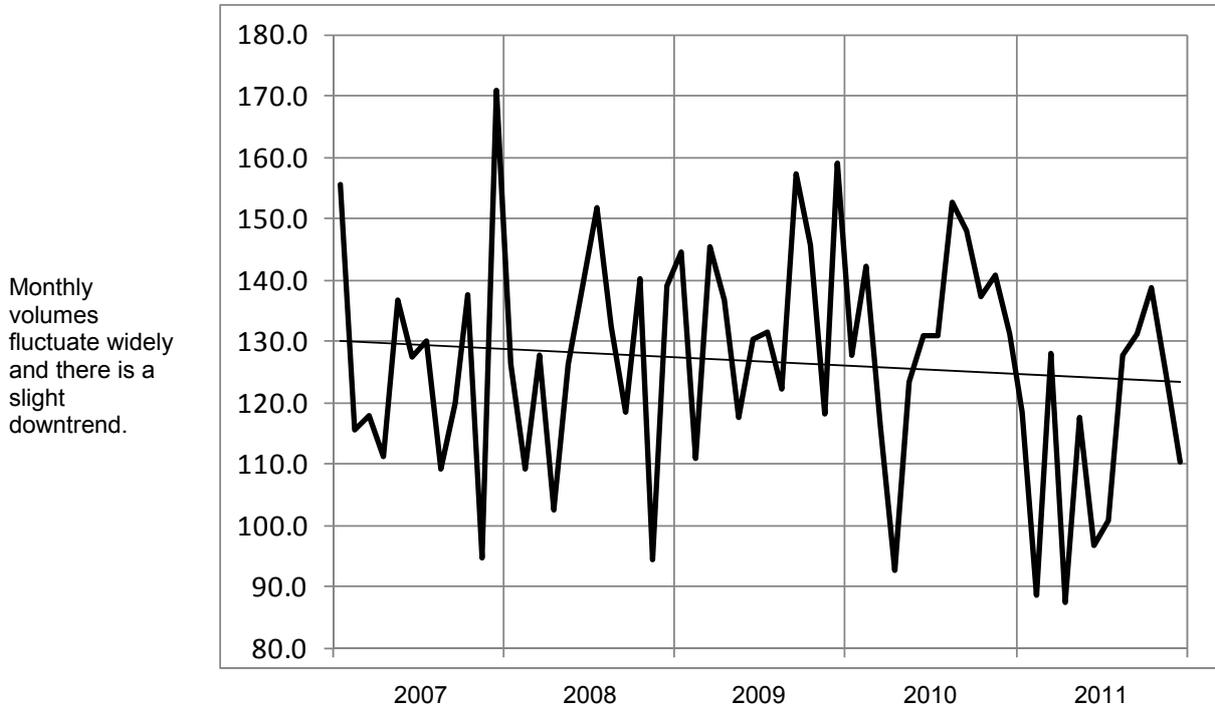


Figure G-31 Monthly average Eggplant prices in Brisbane: AUD per L of carton volume, average of all varieties



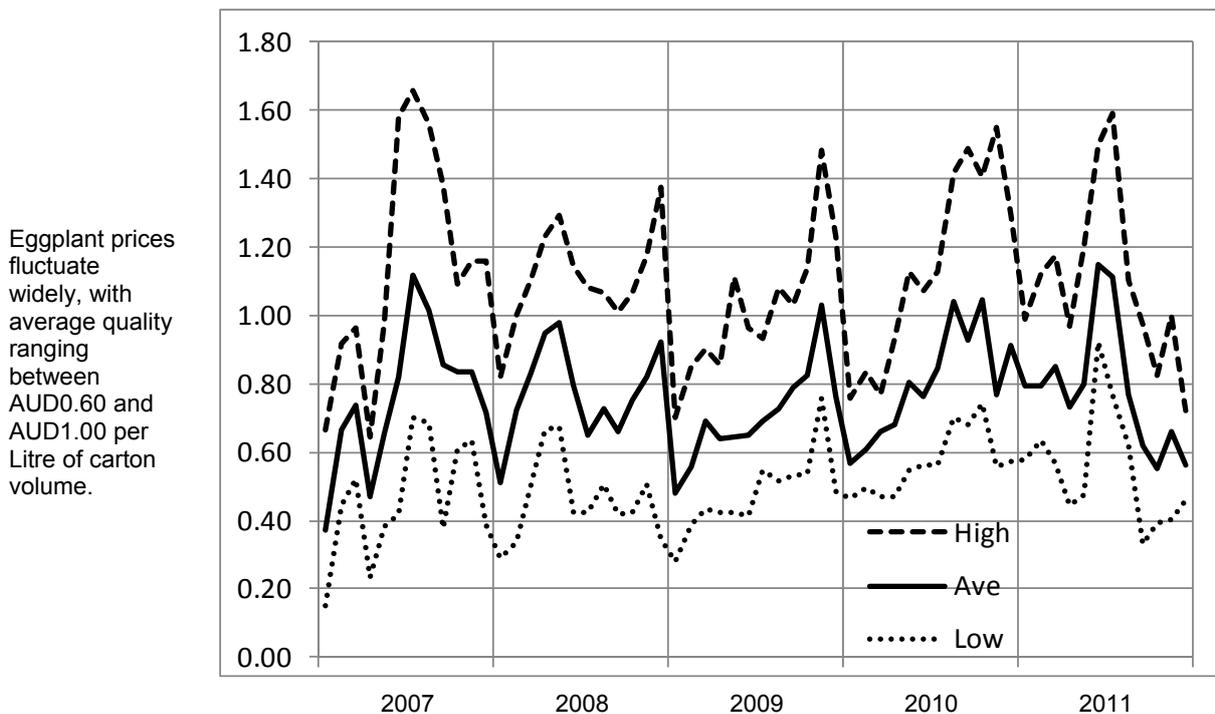
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Figure G-32 Monthly volume of Eggplant traded in Brisbane market (tonnes)



G.10 Eggplant Wholesale Prices in Sydney: 2007–2011

Figure G-33 Eggplant prices in Sydney: AUD per L of carton volume, average of all varieties



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Figure G-34 Eggplant prices in Sydney: FJD per L of carton volume, average of all varieties

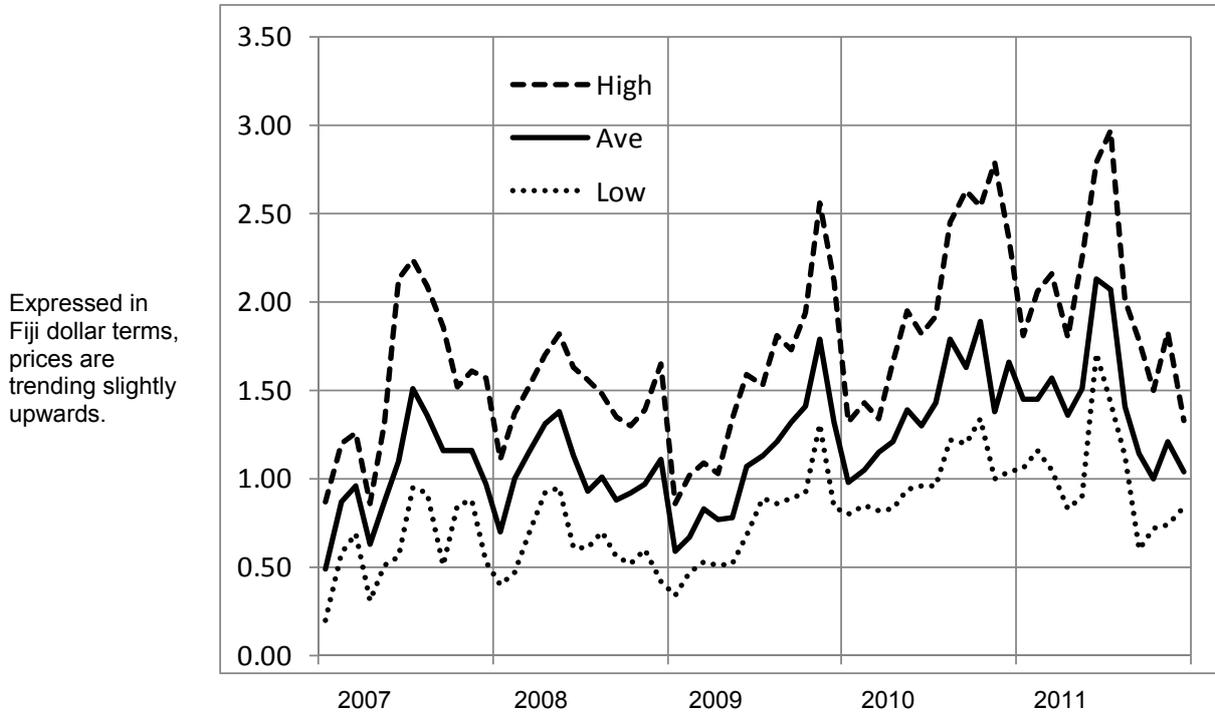
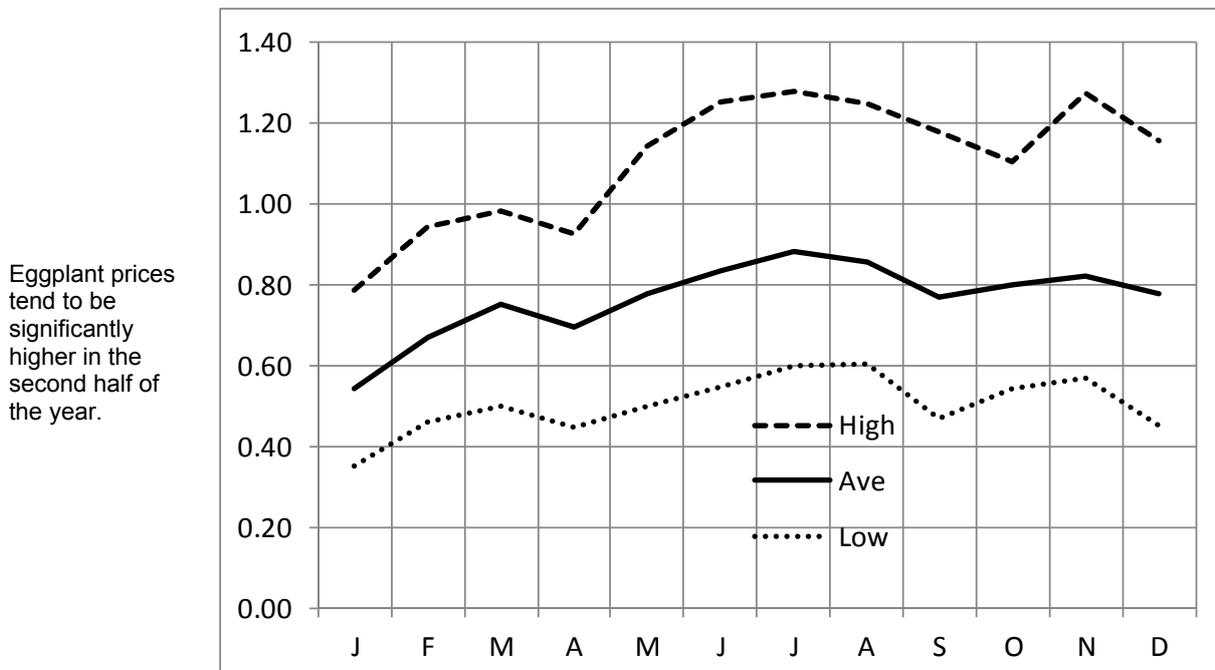


Figure G-35 Monthly average Eggplant prices in Sydney: AUD per L of carton volume, average of all varieties



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G.11 Eggplant Wholesale Prices in Melbourne: 2007–2011

Figure G-36 Eggplant prices in Melbourne: AUD per L of carton volume, average of all varieties

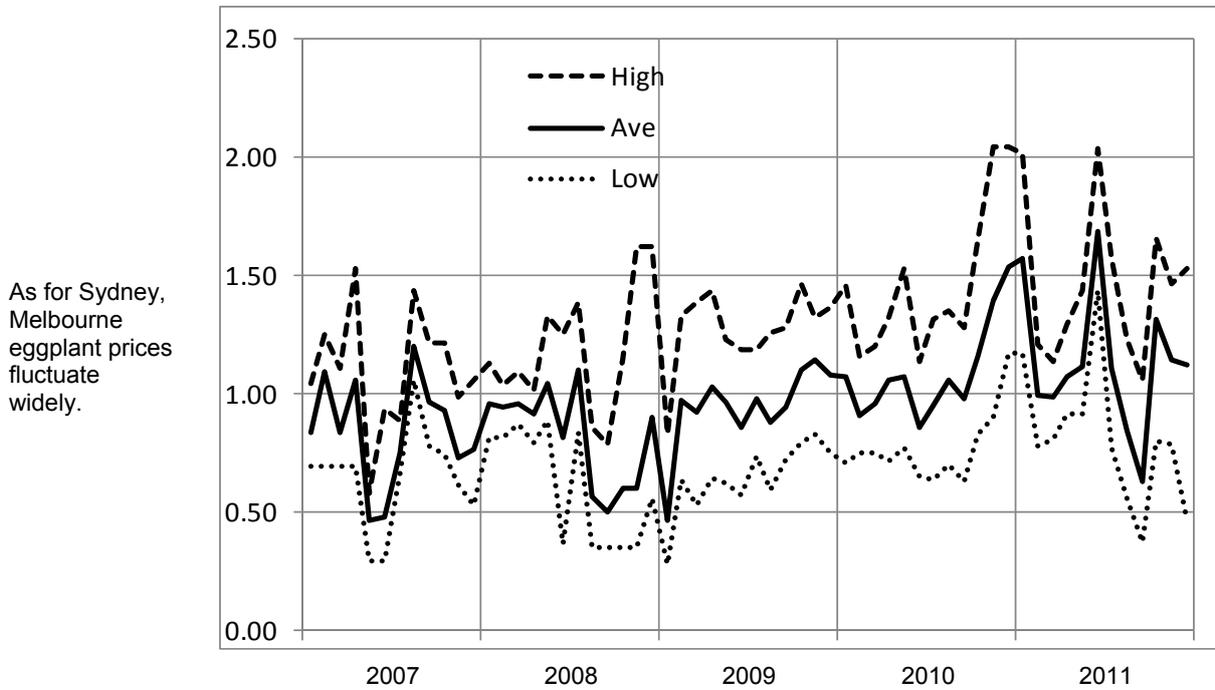
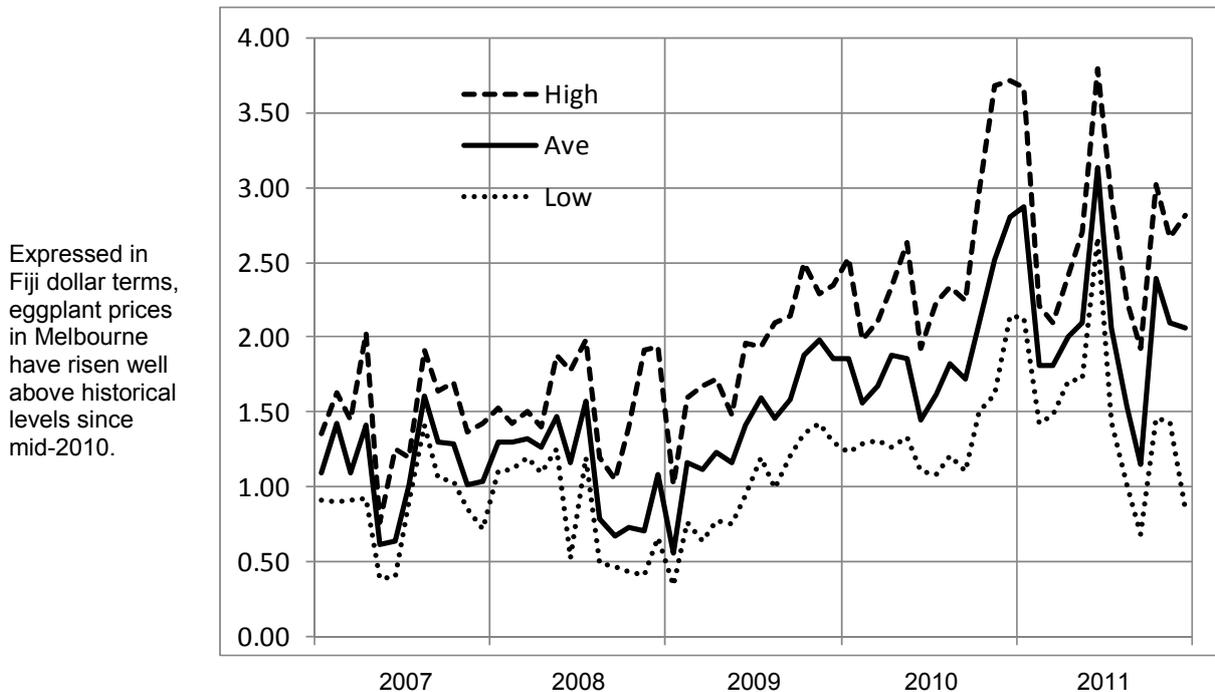
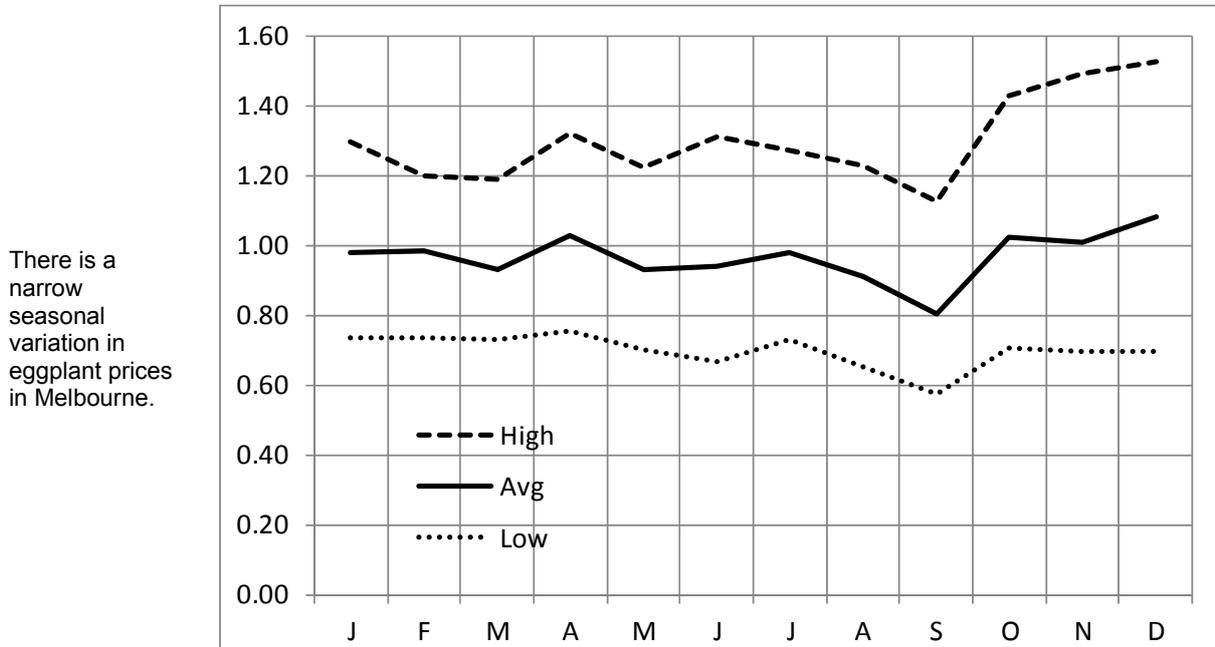


Figure G-37 Eggplant prices in Melbourne: FJD per L of carton volume, average of all varieties



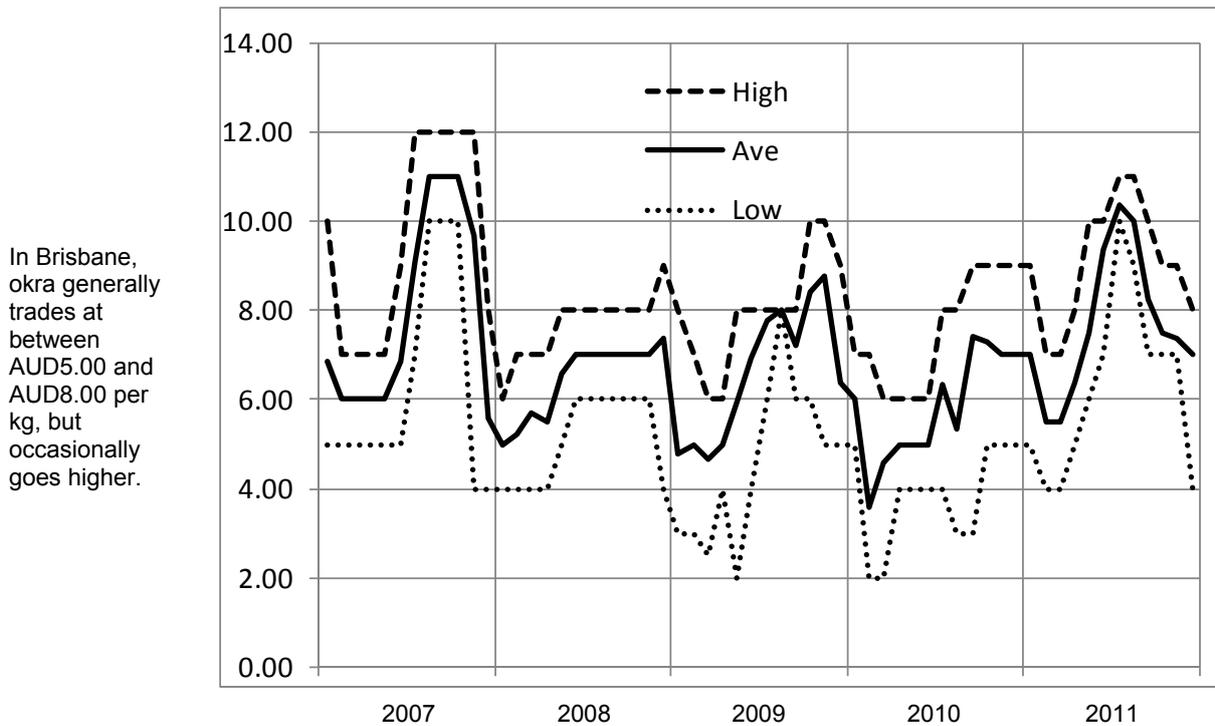
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Figure G-38 Monthly average Eggplant prices in Melbourne: AUD per L of carton volume, average of all varieties



G.12 Okra Wholesale Prices in Brisbane: 2007–2011

Figure G-39 Okra prices in Brisbane: AUD per kg



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Figure G-40 Okra prices in Brisbane: FJD per kg

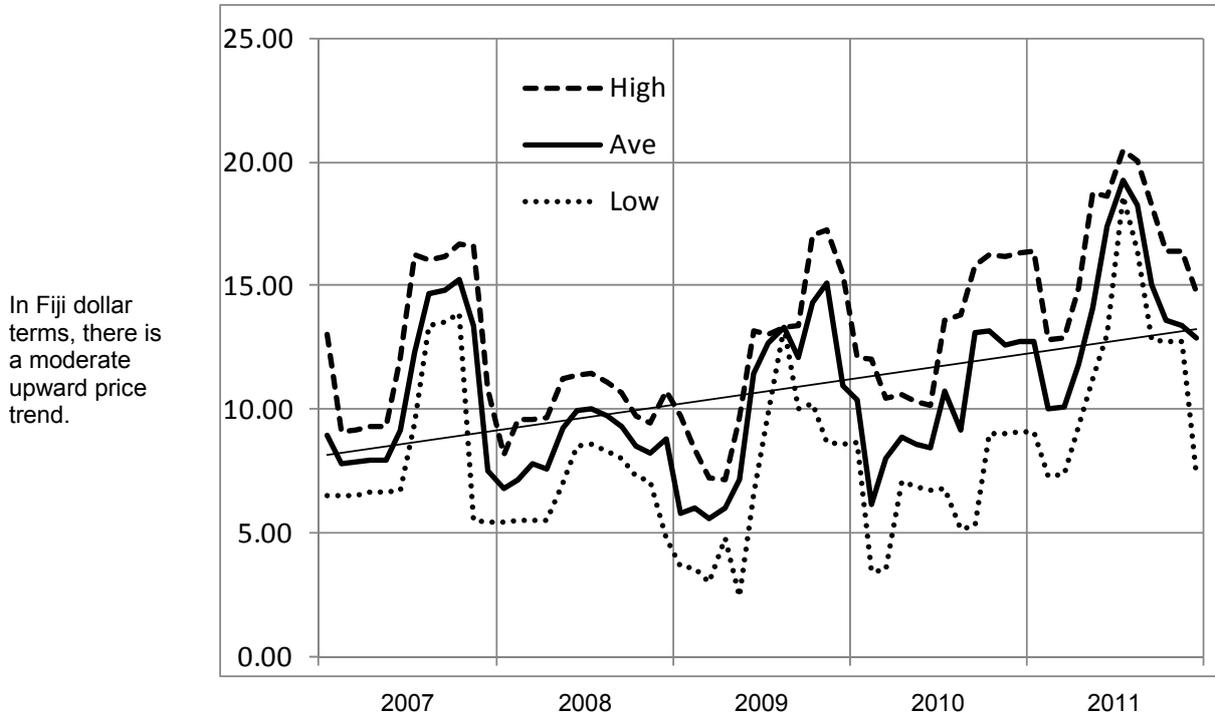
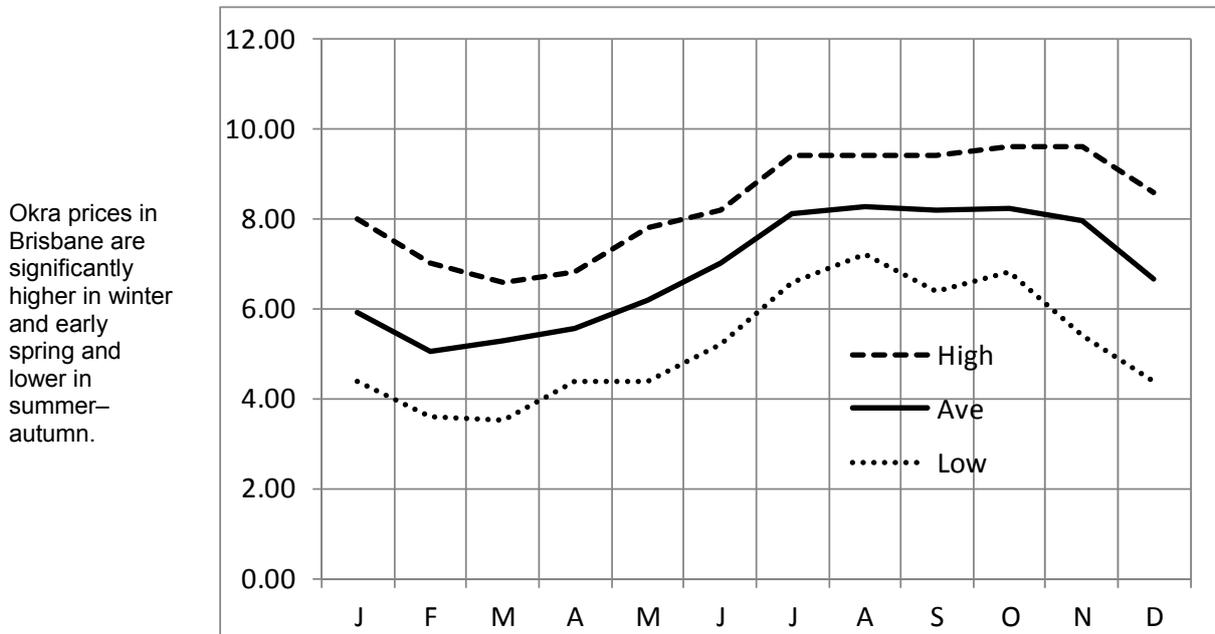
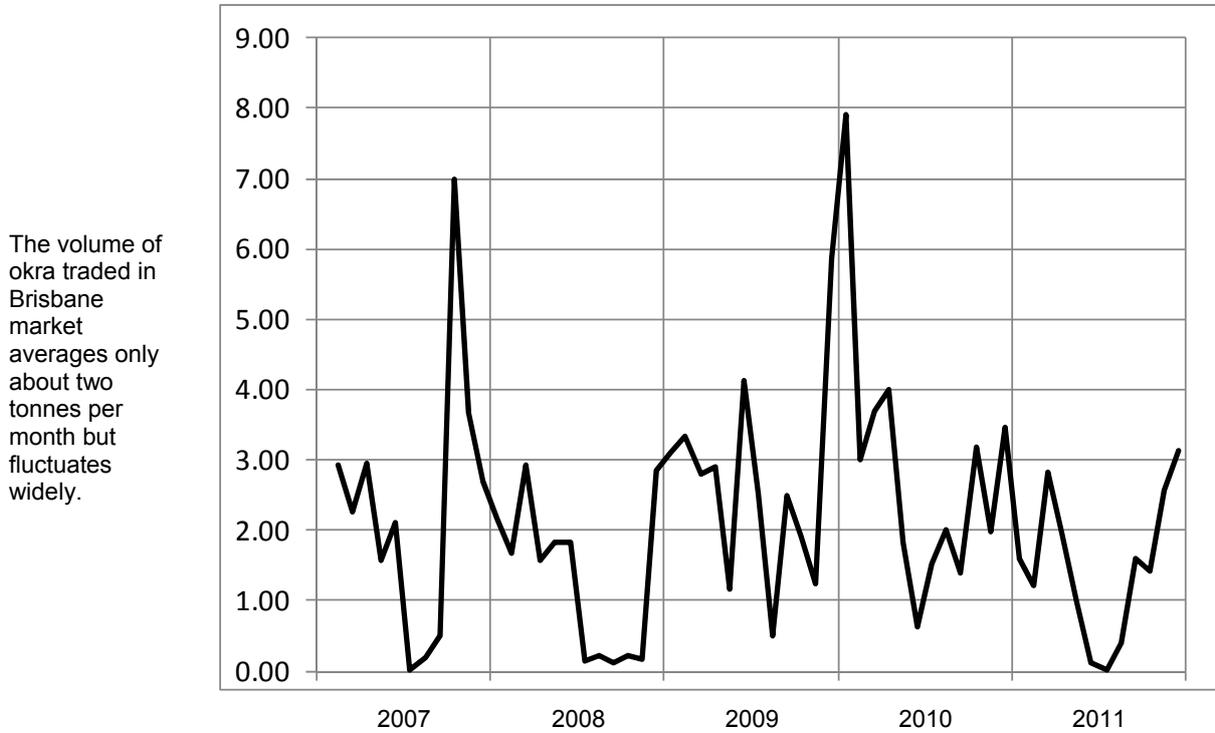


Figure G-41 Monthly average Okra Prices in Brisbane: AUD per kg



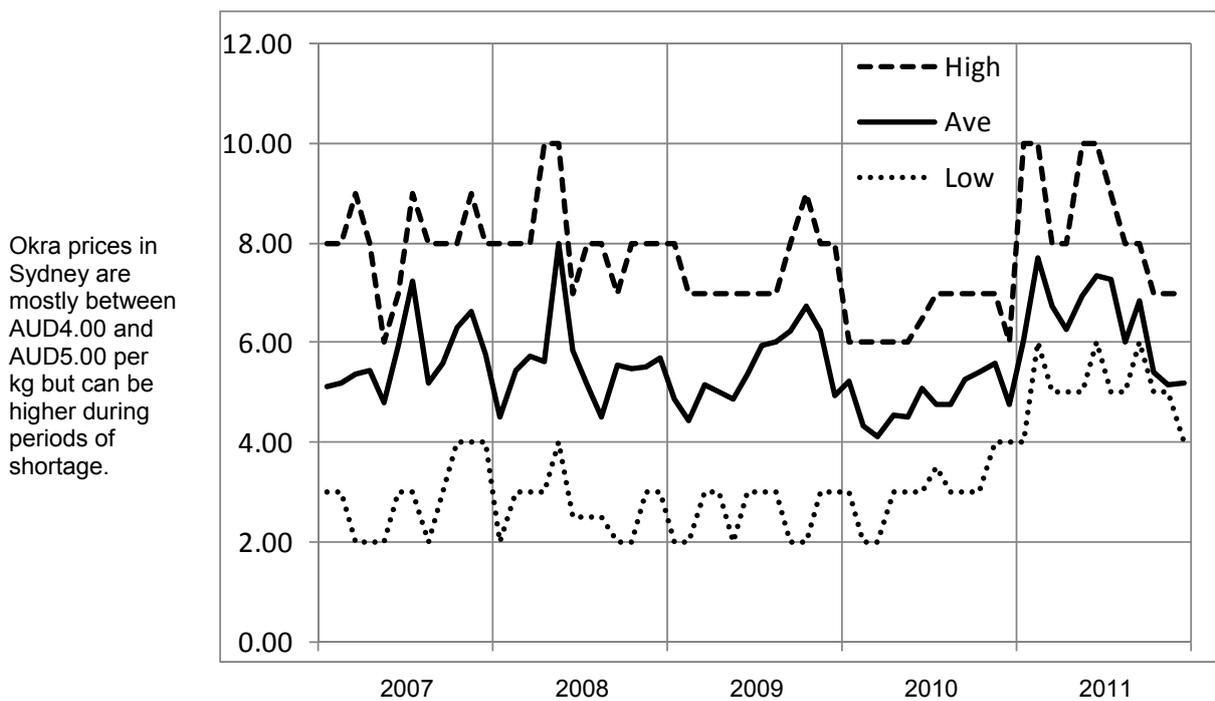
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Figure G-42 Monthly volume of Okra traded in Brisbane market (tonnes)



G.13 Okra Wholesale Prices in Sydney: 2007–2011

Figure G-43 Okra prices in Sydney: AUD per kg



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Figure G-44 Okra prices in Sydney: FJD per kg

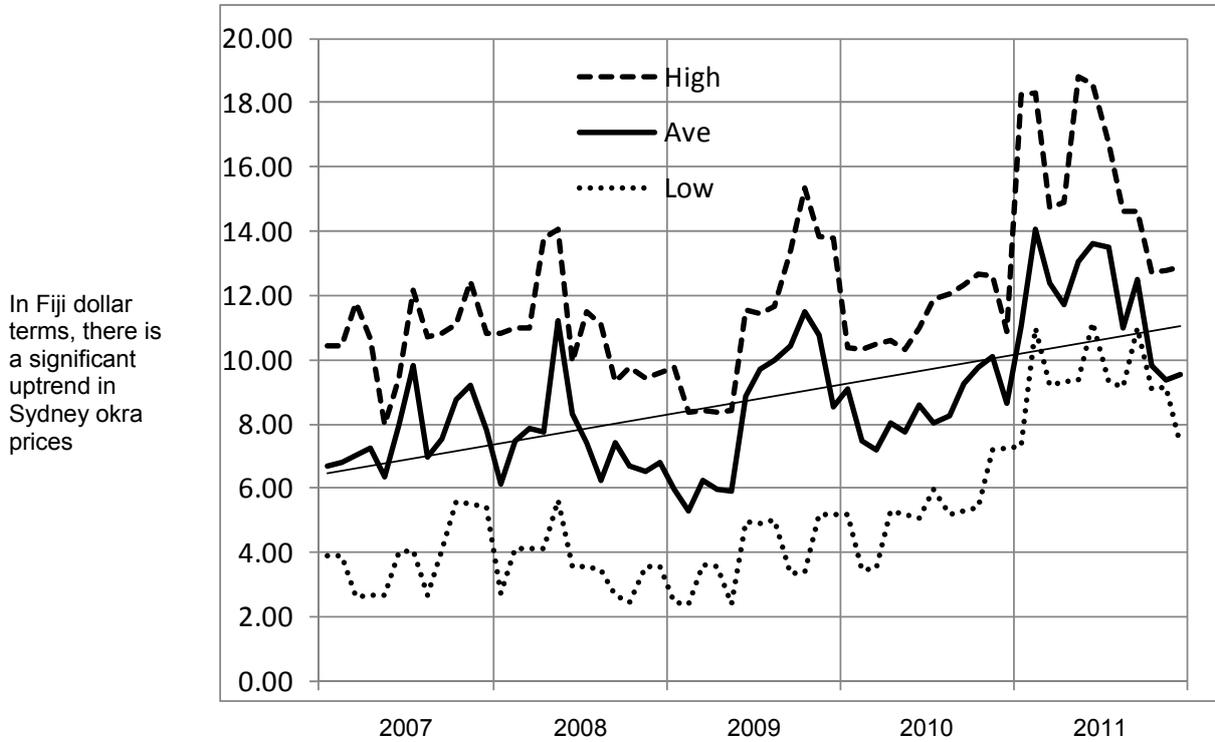
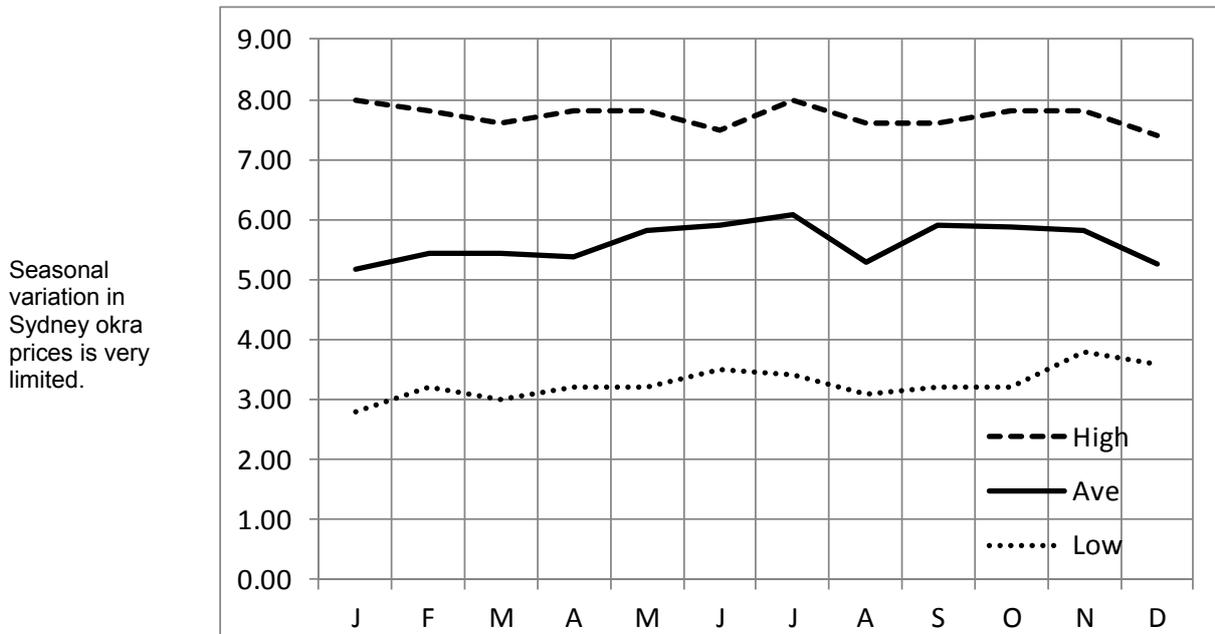


Figure G-45 Monthly average Okra prices in Sydney: AUD per kg



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G.14 Okra Wholesale Prices in Melbourne: 2007–2011

Figure G-46 Okra prices in Melbourne: AUD per kg

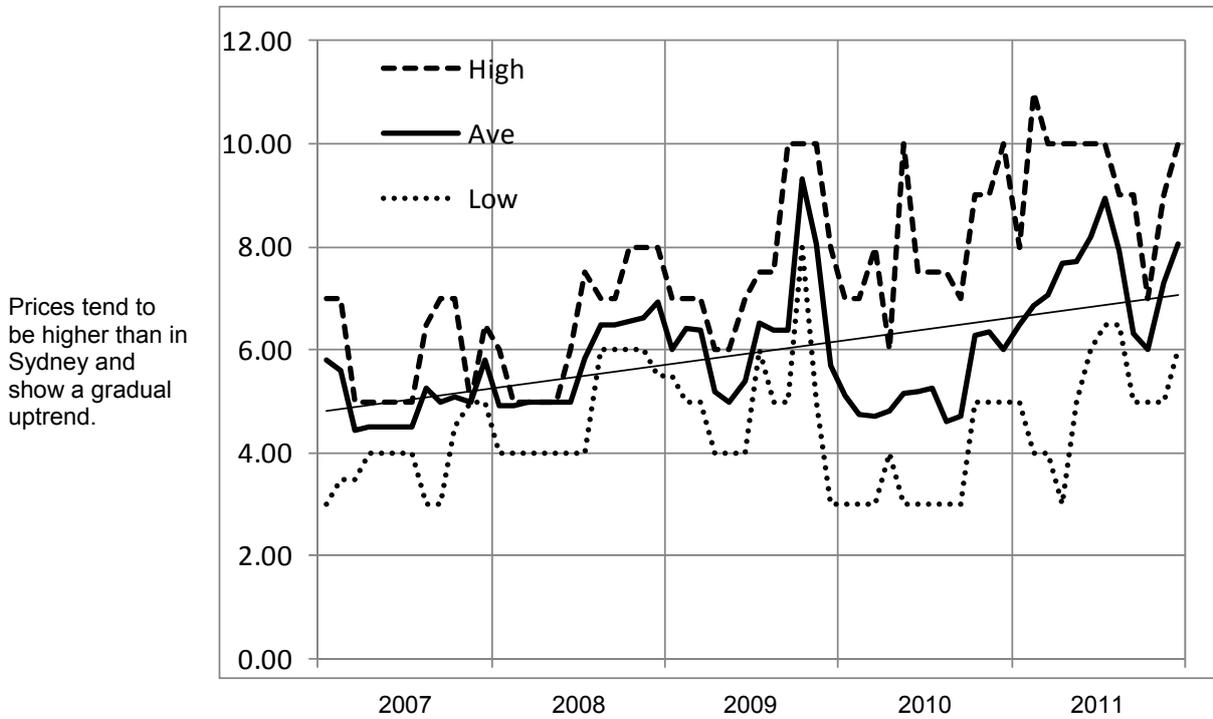
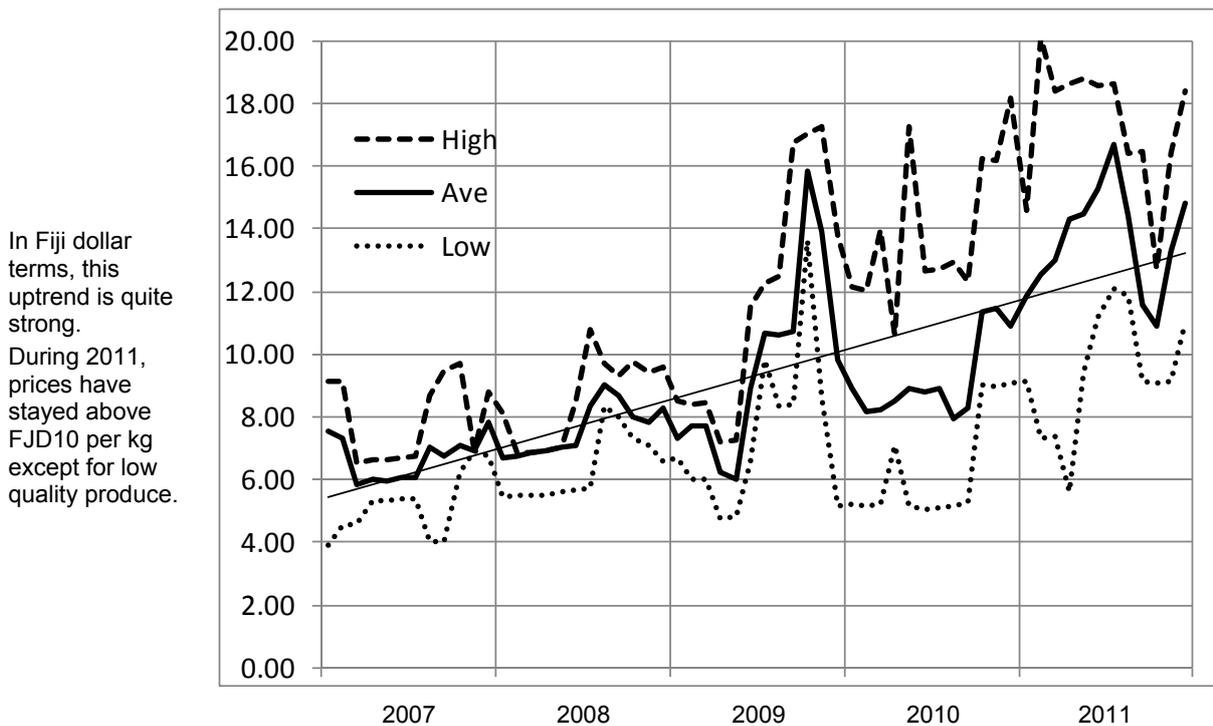
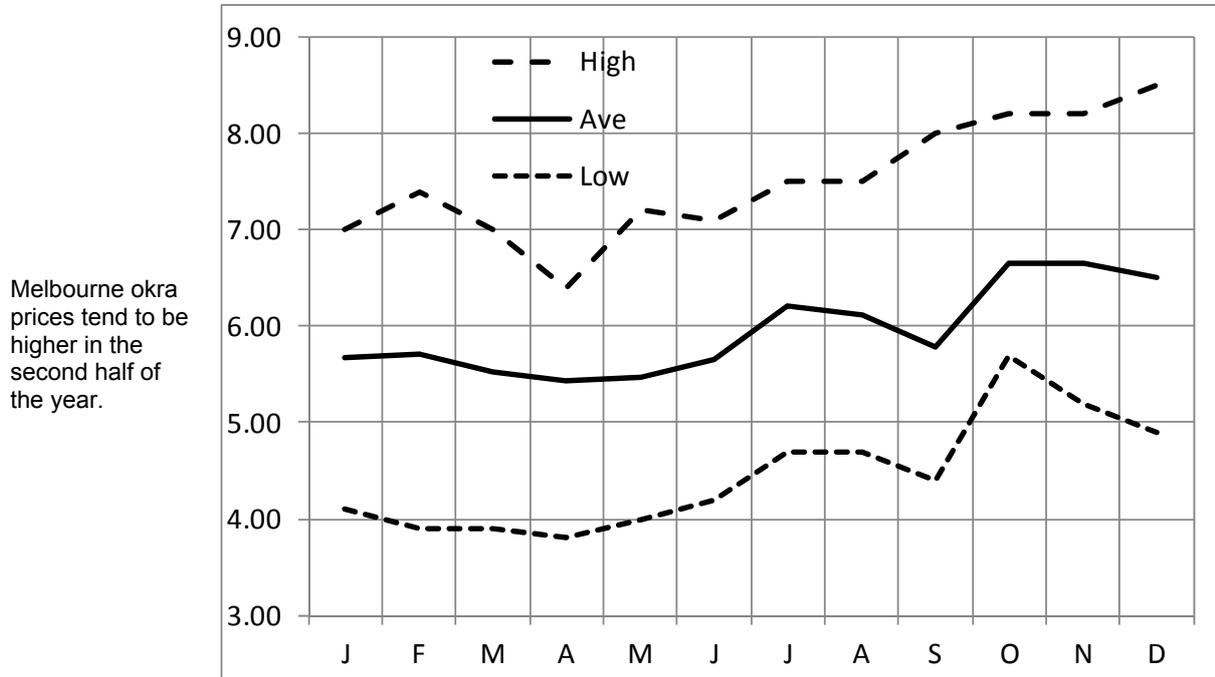


Figure G-47 Okra prices in Melbourne: FJD per kg



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Figure G-48 Monthly average Okra prices in Melbourne: AUD per kg



Appendix H

Appendix H Value Chain Analysis

Pineapple

- Table H-1: Production costs and revenues: Ripley Queen Pineapples
- Table H-2: Collection and transport costs: Ripley Queen Pineapples
- Table H-3: Cost of grading, washing and packing: Ripley Queen Pineapples
- Table H-4: Cost of transport and quarantine clearance: Ripley Queen Pineapples
- Table H-5: Sales revenue through Melbourne wholesale market: Ripley Queen Pineapples
- Table H-6: Value Chain Analysis: Ripley Queen Pineapples
- Table H-7: Summary of Value Chain Analysis: Ripley Queen Pineapples

Chilli: Long Red

- Table H-8: Production costs and revenues: Long Red Chilli
- Table H-9: Collection and transport costs: Long Red Chilli
- Table H-10: Cost of grading, washing and packing: Long Red Chilli
- Table H-11: Cost of transport and quarantine clearance: Long Red Chilli
- Table H-12: Sales revenue through Melbourne wholesale market: Long Red Chilli
- Table H-13: Value Chain Analysis: Long Red Chilli
- Table H-14: Summary of Value Chain Analysis: Long Red Chilli

Chilli: Birdseye

- Table H-15: Production costs and revenues: Birdseye Chilli
- Table H-16: Collection and transport costs: Birdseye Chilli
- Table H-17: Cost of grading, washing and packing: Birdseye Chilli
- Table H-18: Cost of transport and quarantine clearance: Birdseye Chilli
- Table H-19: Sales revenue through Melbourne wholesale market: Birdseye Chilli
- Table H-20: Value Chain Analysis: Birdseye Chilli
- Table H-21: Summary of Value Chain Analysis: Birdseye Chilli

Eggplant: Long Purple

- Table H-22: Production costs and revenues: Long Purple Eggplant
- Table H-23: Collection and transport costs: Long Purple Eggplant
- Table H-24: Cost of grading, washing and packing: Long Purple Eggplant
- Table H-25: Cost of transport and quarantine clearance: Long Purple Eggplant
- Table H-26: Sales revenue through Melbourne wholesale market: Long Purple Eggplant
- Table H-27: Value Chain Analysis: Long Purple Eggplant
- Table H-28: Summary of Value Chain Analysis: Long Purple Eggplant

Okra

- Table H-29: Production costs and revenues: Okra
- Table H-30: Collection and transport costs: Okra
- Table H-31: Cost of grading, washing and packing: Okra
- Table H-32: Cost of transport and quarantine clearance: Okra
- Table H-33: Sales revenue through Melbourne wholesale market: Okra
- Table H-34: Value Chain Analysis: Okra
- Table H-35: Summary of Value Chain Analysis: Okra

Summary

- Table H-36: Summary of Value Chain Analysis

Appendix H

Table H-1 Production costs and revenues: Ripley Queen Pineapples

Unit: One hectare

Gross Income	Unit	F\$/Unit	No Units				F\$				4-Year Average
			Year 1	Year 2	Year 3	Year 4	Year 1	Year 2	Year 3	Year 4	
Fresh pineapples for export	tonnes	800		50	30	20	0	40,000	24,000	16,000	20,000
Variable Costs											
Suckers	Sucker	0.20	30,000				6,000	0	0	0	1,500
NPK	kg	1.60	250	250	250	250	400	400	400	400	400
Urea	kg	1.60	110	110	110	110	176	176	176	176	176
Superphosphate	kg	1.80	250	250	250	250	450	450	450	450	450
Land Clearing	ha	100	1				100	0	0	0	25
Ploughing	ha	250	2				500	0	0	0	125
Harrowing	ha	250	1				250	0	0	0	63
Ridging	ha	250	1				250	0	0	0	63
Eitherel	ml	11		75	75	75	0	825	825	825	619
Total Variable Costs							8,126	1,851	1,851	1,851	3,420
Labour											
Planting	Pers. Day	20	40	40	40	40	800	800	800	800	800
Weeding	Pers. Day	20	20	20	20	20	400	400	400	400	400
Fertiliser Application	Pers. Day	20	30	30	30	30	600	600	600	600	600
Harvesting	Pers. Day	20		30	25	20	0	600	500	400	375
Sorting/Packing	Pers. Day	20		30	25	20	0	600	500	400	375
Total Labour Costs			90	150	140	130	1,800	3,000	2,800	2,600	2,550
Gross Margin per hectare							-9,926	35,149	19,349	11,549	14,857
Gross Margin per labour day							-110	234	138	89	88

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Table H-2 Collection and transport costs: Ripley Queen Pineapples

Cost of Collecting Produce		
Deliver field crates in morning and collect in afternoon		
Distance travelled per collection run	150	km
Field boxes 70cm x 40cm x 30cm = 85 litres	85	Litres
kg of pineapples per field box (20 fruit x 1.2 kg, tops on)	24	kg
Load volume: 4.0m x 2.5m, stack height 2.0m	20	m ³
Field boxes per load	235	boxes
Full load of pineapples	5.6	tonnes
Vehicle Operating Costs for 5 Tonne Truck		
Fuel: 40,000 km/year @ 30L/100km x F\$2.70/L	32,400	F\$/year
Insurance	5,000	F\$/year
Registration	1,200	F\$/year
Driver salary: 52 weeks x F\$250	13,000	F\$/year
Servicing: 5 services per year x F\$1,100	5,500	F\$/year
Tyres: 6 tyres x F\$900 per year	5,400	F\$/year
Repairs and maintenance F\$ 6,000 per year	6,000	F\$/year
Depreciation: F\$140,000 over seven years	20,000	F\$/year
Total Annual Operating Cost	88,500	F\$/year
Operating Cost per km	2.21	
Average loading factor (percent of full load)	80	%
Cost of collecting pineapples	73	F\$/t collected
Cost of collecting pineapples	0.07	F\$/kg collected

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Table H-3 Cost of grading, washing and packing: Ripley Queen Pineapples

Packhouse Labour Costs:		
Cost per worker	30	F\$/shift
No of field boxes graded, washed and packed	20	boxes/worker/shift
Grading losses (% of produce discarded)	10	%
kg packed per worker	432	kg/shift
Total kg packed per shift (20 workers)	8,640	kg/shift
Cost of labour per kg packed	0.07	F\$/kg packed
Packaging Costs:		
Cartons 70cm x 40cm x 18cm = 50 Litres	50	Litres
kg per carton (11 fruits x 1.1kg, tops off)	12	kg
Cost of carton (double reinforced waxed carton)	2.90	F\$/carton
Cost of carton per kg packed	0.24	F\$/kg packed
Other Packhouse Costs (per shift):		
Supervisor/foreman	50	F\$/shift
Electricity and water	200	F\$/shift
Depreciation: F\$350,000 over ten yrs, 150 shifts/yr	233	F\$/shift
Other costs per kg packed	0.06	F\$/kg packed

Table H-4 Cost of transport and quarantine clearance: Ripley Queen Pineapples

Exchange rate: F\$ per A\$	1.87	
Refrigerated 20 foot sea container Nadi-Melbourne a/	3,000	F\$/container
AQIS inspection in Sydney	1,400	A\$/container
AQIS inspection in Sydney	2,618	F\$/container
kg pineapples per container	6,000	kg
AQIS inspection in Sydney	0.44	F\$/kg shipped
Total cost of transport and quarantine clearance	0.94	F\$/kg shipped

a/ Includes all documentation and customs clearance fees

Table H-5 Sales revenue through Melbourne wholesale market: Ripley Queen Pineapples

	Price Range		
	High	Medium	Low
Wholesale price (A\$/kg)	2.10	1.75	1.50
Less allowance for 10% losses	0.21	0.18	0.15
Price per kg shipped (A\$/kg)	1.89	1.58	1.35
Price per kg shipped (F\$/kg)	3.53	2.95	2.52
Less wholesale agent's commission (15%)	0.53	0.44	0.38
Net wholesale price per kg shipped (F\$/kg)	3.00	2.50	2.15

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Table H-6 Value Chain Analysis: Ripley Queen Pineapples

Farm Production Costs		
Variable costs of production	0.17	F\$/kg collected
Labour costs	0.13	F\$/kg collected
Total farm production costs	0.30	F\$/kg collected
Total production costs (after packhouse losses)	0.33	F\$/kg shipped
Cost of Collection and Transport		
Total collection and transport costs	0.07	F\$/kg collected
Total collection and transport costs	0.08	F\$/kg shipped
Packhouse Costs		
Labour	0.07	F\$/kg shipped
Packaging	0.24	F\$/kg shipped
Other packhouse costs	0.06	F\$/kg shipped
Total packhouse costs	0.37	F\$/kg shipped
Transport and Quarantine Costs		
Sea freight Lautoka-Melbourne	0.50	F\$/kg shipped
AQIS inspection in Sydney	0.44	F\$/kg shipped
Total transport and quarantine costs	0.94	F\$/kg shipped
Net Wholesale Price (after losses and commissions)		
High price	3.00	F\$/kg shipped
Medium price	2.50	F\$/kg shipped
Low price	2.15	F\$/kg shipped
Total Gross Margin		
High price	1.29	F\$/kg shipped
Medium price	0.79	F\$/kg shipped
Low price	0.43	F\$/kg shipped

Table H-7 Summary of Value Chain Analysis: Ripley Queen Pineapples

		Wholesale Price		
		High	Medium	Low
Net wholesale price	F\$/kg shipped	3.00	2.50	2.15
Less:				
Production cost	F\$/kg shipped	0.33	0.33	0.33
Collection cost	F\$/kg shipped	0.08	0.08	0.08
Packing cost	F\$/kg shipped	0.37	0.37	0.37
Transport cost	F\$/kg shipped	0.94	0.94	0.94
Gross margin	F\$/kg shipped	1.29	0.79	0.43
Gross margin a/	%	42.9	31.4	20.0

a/ Percent of net wholesale price

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Table H-8 Production costs and revenues: Long Red Chilli ^{a/}

Unit: One hectare

Gross Income	Unit	F\$/Unit	No Units	F\$
Fresh chillies for export	kg	2.00	8,000	16,000
Total Gross Income				16,000
Variable Costs				
Seed	kg	40.00	2.0	80
NPK	kg	1.60	350	560
Urea	kg	1.60	200	320
Malathion	L	16.00	10	160
Rambo herbicide	L	8.20	15	123
Ploughing	ha	250	2	500
Harrowing	ha	250	1	250
Ridging	ha	250	1	250
Transport b/				0
Total Variable Costs				2,243
Labour				
Planting	Pers. Day	20	40	800
Weeding	Pers. Day	20	20	400
Fertiliser Application	Pers. Day	20	30	600
Harvesting	Pers. Day	20	120	2,400
Sorting/Packing	Pers. Day	20	60	1,200
Total Labour Cost			270	5,400
Gross Margin per hectare				8,357
Gross Margin per labour day				31

a/ Hot Rod or Red Fire varieties

b/ Exporter collects from the farm

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Table H-9 Collection and transport costs: Long Red Chilli

Cost of Collecting Produce		
Deliver field crates in morning and collect in afternoon		
Collection rounds per week	3	days
Distance travelled per collection run	300	km
Field boxes 70cm x 40cm x 30cm = 85 litres	85	Litres
kg of chillies per field box	20	kg
Load volume: 4.0m x 2.5m, stack height 2.0m	20	m ³
Field boxes per load	235	boxes
Full load of chillies	4.7	tonnes
Vehicle Operating Costs for 5 Tonne Truck		
Fuel: 40,000 km/year @ 30L/100km x F\$2.70/L	32,400	F\$/year
Insurance	5,000	F\$/year
Registration	1,200	F\$/year
Driver salary: 52 weeks x F\$250	13,000	F\$/year
Servicing: 5 services per year x F\$1,100	5,500	F\$/year
Tyres: 6 tyres x F\$900 per year	5,400	F\$/year
Repairs and maintenance F\$ 6,000 per year	6,000	F\$/year
Depreciation: F\$140,000 over seven years	20,000	F\$/year
Total Annual Operating Cost	88,500	F\$/year
Operating Cost per km	2.21	
Average loading factor (percent of full load)	70	%
Cost of collecting chillies	201	F\$/t collected
Cost of collecting chillies	0.20	F\$/kg collected

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Table H-10 Cost of grading, washing and packing: Long Red Chilli

Packhouse Labour Costs:		
Cost per worker	30	F\$/shift
No of field boxes graded, washed and packed	5	boxes/worker/shift
Grading losses (% of produce discarded)	25	%
kg packed per worker	75	kg/shift
Total kg packed per shift (20 workers)	1,500	kg/shift
Cost of labour per kg packed	0.40	F\$/kg packed
Packaging Costs:		
Cartons 40cm x 30cm x 33cm = 40 Litres	40	Litres
kg of chillies per carton	10	kg
Cost of carton and plastic liners	1.80	F\$/carton
Cost of carton and plastic liners per kg packed	0.18	F\$/kg packed
Other Packhouse Costs (per shift):		
Supervisor/foreman	50	F\$/shift
Electricity and water	200	F\$/shift
Depreciation: F\$350,000 over ten yrs, 150 shifts/yr	233	F\$/shift
Other costs per kg packed	0.32	F\$/kg packed

Table H-11 Cost of transport and quarantine clearance: Long Red Chilli

Exchange rate: F\$ per A\$	1.87	
Air freight Nadi-Sydney a/	1.70	F\$/kg shipped
AQIS inspection in Sydney	1,400	A\$/shipment
AQIS inspection in Sydney	2,618	F\$/shipment
kg per shipment	2,000	kg
AQIS inspection in Sydney	1.31	F\$/kg shipped
Total cost of transport and quarantine clearance	3.01	F\$/kg shipped

a/ Includes all documentation and customs clearance fees

Table H-12 Sales revenue through Sydney wholesale market: Long Red Chilli

	Price Range		
	High	Medium	Low
Wholesale price (A\$/kg)	7.20	6.00	5.00
Less allowance for 10% losses	0.72	0.60	0.50
Price per kg shipped (A\$/kg)	6.48	5.40	4.50
Price per kg shipped (F\$/kg)	12.12	10.10	8.42
Less wholesale agent's commission (15%)	1.82	1.51	1.26
Net wholesale price per kg shipped (F\$/kg)	10.30	8.58	7.15

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Table H-13 Value Chain Analysis: Long Red Chilli

Farm Production Costs		
Variable costs of production	0.28	F\$/kg collected
Labour costs	0.68	F\$/kg collected
Total farm production costs	0.96	F\$/kg collected
Total production costs (after packhouse losses)	1.27	F\$/kg shipped
Cost of Collection and Transport		
	0.20	F\$/kg collected
Total collection and transport costs	0.27	F\$/kg shipped
Packhouse Costs		
Labour	0.40	F\$/kg shipped
Packaging	0.18	F\$/kg shipped
Other packhouse costs	0.32	F\$/kg shipped
Total packhouse costs	0.90	F\$/kg shipped
Transport and Quarantine Costs		
Air freight Nadi-Sydney	1.70	F\$/kg shipped
AQIS inspection in Sydney	1.31	F\$/kg shipped
Total transport and quarantine costs	3.01	F\$/kg shipped
Net Wholesale Price (after losses and commissions)		
High price	10.30	F\$/kg shipped
Medium price	8.58	F\$/kg shipped
Low price	7.15	F\$/kg shipped
Total Gross Margin		
High price	4.85	F\$/kg shipped
Medium price	3.13	F\$/kg shipped
Low price	1.70	F\$/kg shipped

Table H-14 Summary of Value Chain Analysis: Long Red Chilli

		Wholesale Price		
		High	Medium	Low
Net wholesale price	F\$/kg shipped	10.30	8.58	7.15
Less:				
Production cost	F\$/kg shipped	1.27	1.27	1.27
Collection cost	F\$/kg shipped	0.27	0.27	0.27
Packing cost	F\$/kg shipped	0.90	0.90	0.90
Transport cost	F\$/kg shipped	3.01	3.01	3.01
Gross margin	F\$/kg shipped	4.85	3.13	1.70
Gross margin a/	%	47.1	36.5	23.8

a/ Percent of net wholesale price

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Table H-15 Production costs and revenues: Birdseye Chili

Unit: One hectare

Gross Income	Unit	F\$/Unit	No Units	F\$
Fresh chillies for export	kg	3.00	5,000	15,000
Total Gross Income				15,000
Variable Costs				
Seed	kg	40.00	2.0	80
NPK	kg	1.60	350	560
Urea	kg	1.60	200	320
Malathion	L	16.00	10	160
Rambo herbicide	L	8.20	15	123
Ploughing	ha	250	2	500
Harrowing	ha	250	1	250
Ridging	ha	250	1	250
Transport a/				0
Total Variable Costs				2,243
Labour				
Planting	Pers. Day	20	40	800
Weeding	Pers. Day	20	20	400
Fertiliser Application	Pers. Day	20	30	600
Harvesting	Pers. Day	20	220	4,400
Sorting/Packing	Pers. Day	20	90	1,800
Total Labour Cost			400	8,000
Gross Margin per hectare				4,757
Gross Margin per labour day				12

a/ Exporter collects from the farm

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Table H-16 Collection and transport costs: Long Red Chilli

Cost of Collecting Produce		
Deliver field crates in morning and collect in afternoon		
Collection rounds per week	3	days
Distance travelled per collection run	300	km
Field boxes 70cm x 40cm x 30cm = 85 litres	85	Litres
kg of chillies per field box	25	kg
Load volume: 4.0m x 2.5m, stack height 2.0m	20	m ³
Field boxes per load	235	boxes
Full load of chillies	5.9	tonnes
Vehicle Operating Costs for 5 Tonne Truck		
Fuel: 40,000 km/year @ 30L/100km x F\$2.70/L	32,400	F\$/year
Insurance	5,000	F\$/year
Registration	1,200	F\$/year
Driver salary: 52 weeks x F\$250	13,000	F\$/year
Servicing: 5 services per year x F\$1,100	5,500	F\$/year
Tyres: 6 tyres x F\$900 per year	5,400	F\$/year
Repairs and maintenance F\$ 6,000 per year	6,000	F\$/year
Depreciation: F\$140,000 over seven years	20,000	F\$/year
Total Annual Operating Cost	88,500	F\$/year
Operating Cost per km	2.21	
Average loading factor (percent of full load)	70	%
Cost of collecting chillies	161	F\$/t collected
Cost of collecting chillies	0.16	F\$/kg collected

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Table H-17 Cost of grading, washing and packing: Birdseye Chilli

Packhouse Labour Costs:		
Cost per worker	30	F\$/shift
No of field boxes graded, washed and packed	3	boxes/worker/shift
Grading losses (% of produce discarded)	25	%
kg packed per worker	56	kg/shift
Total kg packed per shift (20 workers)	1,125	kg/shift
Cost of labour per kg packed	0.53	F\$/kg packed
Packaging Costs:		
Cartons 40cm x 30cm x 33cm = 40 Litres	40	Litres
kg of chillies per carton	10	kg
Cost of carton and plastic liners	1.80	F\$/carton
Cost of carton and plastic liners per kg packed	0.18	F\$/kg packed
Other Packhouse Costs (per shift):		
Supervisor/foreman	50	F\$/shift
Electricity and water	200	F\$/shift
Depreciation: F\$350,000 over ten yrs, 150 shifts/yr	233	F\$/shift
Other costs per kg packed	0.43	F\$/kg packed

Table H-18 Cost of transport and quarantine clearance: Birdseye Chilli

Exchange rate: F\$ per A\$	1.87	
Air freight Nadi-Sydney a/	1.70	F\$/kg shipped
AQIS inspection in Sydney	1,400	A\$/shipment
AQIS inspection in Sydney	2,618	F\$/shipment
kg per shipment	2,000	kg
AQIS inspection in Sydney	1.31	F\$/kg shipped
Total cost of transport and quarantine clearance	3.01	F\$/kg shipped

a/ Includes all documentation and customs clearance fees

Table H-19 Sales revenue through Sydney wholesale market: Birdseye Chilli

	Price Range		
	High	Medium	Low
Wholesale price (A\$/kg)	9.60	8.00	6.70
Less allowance for 10% losses	0.96	0.80	0.67
Price per kg shipped (A\$/kg)	8.64	7.20	6.03
Price per kg shipped (F\$/kg)	16.16	13.46	11.28
Less wholesale agent's commission (15%)	2.42	2.02	1.69
Net wholesale price per kg shipped (F\$/kg)	13.73	11.44	9.58

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Table H-20 Value Chain Analysis: Birdseye Chilli

Farm Production Costs		
Variable costs of production	0.45	F\$/kg collected
Labour costs	1.60	F\$/kg collected
Total farm production costs	2.05	F\$/kg collected
Total production costs (after packhouse losses)	2.73	F\$/kg shipped
Cost of Collection and Transport		
	0.16	F\$/kg collected
Total collection and transport costs	0.21	F\$/kg shipped
Packhouse Costs		
Labour	0.53	F\$/kg shipped
Packaging	0.18	F\$/kg shipped
Other packhouse costs	0.43	F\$/kg shipped
Total packhouse costs	1.14	F\$/kg shipped
Transport and Quarantine Costs		
Air freight Nadi-Sydney	1.70	F\$/kg shipped
AQIS inspection in Sydney	1.31	F\$/kg shipped
Total transport and quarantine costs	3.01	F\$/kg shipped
Net Wholesale Price (after losses and commissions)		
High price	13.73	F\$/kg shipped
Medium price	11.44	F\$/kg shipped
Low price	9.58	F\$/kg shipped
Total Gross Margin		
High price	6.64	F\$/kg shipped
Medium price	4.35	F\$/kg shipped
Low price	2.49	F\$/kg shipped

Table H-21 Summary of Value Chain Analysis: Birdseye Chilli

		Wholesale Price		
		High	Medium	Low
Net wholesale price	F\$/kg shipped	13.73	11.44	9.58
Less:				
Production cost	F\$/kg shipped	2.73	2.73	2.73
Collection cost	F\$/kg shipped	0.21	0.21	0.21
Packing cost	F\$/kg shipped	1.14	1.14	1.14
Transport cost	F\$/kg shipped	3.01	3.01	3.01
Gross margin	F\$/kg shipped	6.64	4.35	2.49
Gross margin a/	%	48.3	38.0	25.9

a/ Percent of net wholesale price

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Table H-22 Production costs and revenue: Long Purple Eggplant

Unit: One hectare

Gross Income	Unit	F\$/Unit	No Units	F\$
Fresh eggplant for export	kg	0.80	15,000	12,000
Variable Costs				
Seed	kg	50.00	0.25	13
NPK	kg	1.60	220	352
Urea	kg	1.60	100	160
Gramoxone	L	16.00	6	96
Ploughing	ha	250	2	500
Harrowing	ha	250	2	500
Ridging	ha	250	1	250
Transport				0
Total Variable Costs				1,871
Labour				
Planting	Pers. Day	20	40	800
Weeding	Pers. Day	20	20	400
Fertiliser Application	Pers. Day	20	30	600
Harvesting	Pers. Day	20	80	1,600
Sorting/Packing	Pers. Day	20	50	1,000
Total Labour Cost			220	4,400
Gross Margin per hectare				5,730
Gross Margin per labour day				26

a/ Exporter collects from the farm

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Table H-23 Collection and transport costs: Long Purple Eggplant

Cost of Collecting Produce		
Deliver field crates in morning and collect in afternoon		
Collection rounds per week	3	days
Distance travelled per collection run	300	km
Field boxes 70cm x 40cm x 30cm = 85 litres	85	Litres
kg of eggplant per field box	25	kg
Load volume: 4.0m x 2.5m, stack height 2.0m	20	m ³
Field boxes per load	235	boxes
Full load of eggplant	5.9	tonnes
Vehicle Operating Costs for 5 Tonne Truck		
Fuel: 40,000 km/year @ 30L/100km x F\$2.70/L	32,400	F\$/year
Insurance	5,000	F\$/year
Registration	1,200	F\$/year
Driver salary: 52 weeks x F\$250	13,000	F\$/year
Servicing: 5 services per year x F\$1,100	5,500	F\$/year
Tyres: 6 tyres x F\$900 per year	5,400	F\$/year
Repairs and maintenance F\$ 6,000 per year	6,000	F\$/year
Depreciation: F\$140,000 over seven years	20,000	F\$/year
Total Annual Operating Cost	88,500	F\$/year
Operating Cost per km	2.21	
Average loading factor (percent of full load)	70	%
Cost of collecting eggplant	161	F\$/t collected
Cost of collecting eggplant	0.16	F\$/kg collected

Table H-24 Cost of grading, washing and packing: Long Purple Eggplant

Packhouse Labour Costs: to sort and pack in bulk bins		
Cost per worker	30	F\$/shift
No of field boxes graded, washed and packed	8	boxes/worker/shift
Grading losses (% of produce discarded)	25	%
kg packed per worker	150	kg/shift
Total kg packed per shift (20 workers)	3,000	kg/shift
Cost of labour per kg packed	0.20	F\$/kg packed
HTFA and Packaging Costs: paid to Natures Way Cooperative		
Cost of HTFA, carton and packing	0.72	F\$/kg packed

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Table H-25 Cost of transport and quarantine clearance: Long Purple Eggplant

Exchange rate: F\$ per A\$	1.87	
Air freight Nadi-Sydney a/	1.70	F\$/kg shipped
AQIS inspection in Sydney	1,400	A\$/shipment
AQIS inspection in Sydney	2,618	F\$/shipment
kg per shipment	2,000	kg
AQIS inspection in Sydney	1.31	F\$/kg shipped
Total cost of transport and quarantine clearance	3.01	F\$/kg shipped

a/ Includes all documentation and customs clearance fees

Table H-26 Sales revenue through Sydney wholesale market: Long Purple Eggplant

	Price Range		
	High	Medium	Low
Wholesale price (A\$/kg)	3.60	3.00	2.50
Less allowance for 10% losses	0.36	0.30	0.25
Price per kg shipped (A\$/kg)	3.24	2.70	2.25
Price per kg shipped (F\$/kg)	6.06	5.05	4.21
Less wholesale agent's commission (15%)	0.91	0.76	0.63
Net wholesale price per kg shipped (F\$/kg)	5.15	4.29	3.58

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Table H-27 Value Chain Analysis: Long Purple Eggplant

Farm Production Costs		
Variable costs of production	0.12	F\$/kg collected
Labour costs	0.29	F\$/kg collected
Total farm production costs	0.42	F\$/kg collected
Total production costs (after packhouse losses)	0.56	F\$/kg shipped
Cost of Collection and Transport		
	0.16	F\$/kg collected
Total collection and transport costs	0.21	F\$/kg shipped
HTFA Treatment and Packing Costs		
Grade and pack in bulk bins	0.20	F\$/kg shipped
HTFA, carton and packing	0.72	F\$/kg shipped
Total HTFA and packing costs	0.92	F\$/kg shipped
Transport and Quarantine Costs		
Air freight Nadi-Sydney	1.70	F\$/kg shipped
AQIS inspection in Sydney	1.31	F\$/kg shipped
Total transport and quarantine costs	3.01	F\$/kg shipped
Net Wholesale Price (after losses and commissions)		
High price	5.15	F\$/kg shipped
Medium price	4.29	F\$/kg shipped
Low price	3.58	F\$/kg shipped
Total Gross Margin		
High price	0.45	F\$/kg shipped
Medium price	-0.41	F\$/kg shipped
Low price	-1.12	F\$/kg shipped

Table H-28 Summary of Value Chain Analysis: Long Purple Eggplant

		Wholesale Price		
		High	Medium	Low
Net wholesale price	F\$/kg shipped	5.15	4.29	3.58
Less:				
Production cost	F\$/kg shipped	0.56	0.56	0.56
Collection cost	F\$/kg shipped	0.21	0.21	0.21
Packing cost	F\$/kg shipped	0.92	0.92	0.92
Transport cost	F\$/kg shipped	3.01	3.01	3.01
Gross margin	F\$/kg shipped	0.45	-0.41	-1.12
Gross margin a/	%	8.7	-9.5	-31.5

a/ Percent of net wholesale price

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Table H-29 Production costs and revenues: Okra

Unit: One hectare

Gross Income	Unit	F\$/Unit	No Units	F\$
Fresh okra for export	kg	1.50	10,000	15,000
Variable Costs				
Seed	kg	30.00	8.00	240
NPK	kg	1.60	300	480
Urea	kg	1.60	120	192
Gramoxone	L	16.00	6	96
Ploughing	ha	250	2	500
Harrowing	ha	250	1	250
Ridging	ha	250	1	250
Transport a/				0
Total Variable Costs				2,008
Labour				
Planting	Pers. Day	20	40	800
Weeding	Pers. Day	20	20	400
Fertiliser Application	Pers. Day	20	30	600
Harvesting	Pers. Day	20	100	2,000
Sorting/Packing	Pers. Day	20	50	1,000
Total Labour Cost			240	4,800
Gross Margin per hectare				8,192
Gross Margin per labour day				34

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Table H-30 Collection and transport costs: Okra

Cost of Collecting Produce		
Deliver field crates in morning and collect in afternoon		
Collection rounds per week	3	days
Distance travelled per collection run	300	km
Field boxes 70cm x 40cm x 30cm = 85 litres	85	Litres
kg of okra per field box	25	kg
Load volume: 4.0m x 2.5m, stack height 2.0m	20	m ³
Field boxes per load	235	boxes
Full load of okra	5.9	tonnes
Vehicle Operating Costs for 5 Tonne Truck		
Fuel: 40,000 km/year @ 30L/100km x F\$2.70/L	32,400	F\$/year
Insurance	5,000	F\$/year
Registration	1,200	F\$/year
Driver salary: 52 weeks x F\$250	13,000	F\$/year
Servicing: 5 services per year x F\$1,100	5,500	F\$/year
Tyres: 6 tyres x F\$900 per year	5,400	F\$/year
Repairs and maintenance F\$ 6,000 per year	6,000	F\$/year
Depreciation: F\$140,000 over seven years	20,000	F\$/year
Total Annual Operating Cost	88,500	F\$/year
Operating Cost per km	2.21	
Average loading factor (percent of full load)	70	%
Cost of collecting okra	161	F\$/t collected
Cost of collecting okra	0.16	F\$/kg collected

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Table H-31 Cost of grading, washing and packing: Okra

Packhouse Labour Costs:		
Cost per worker	30	F\$/shift
No of field boxes graded, washed and packed	5	boxes/worker/shift
Grading losses (% of produce discarded)	25	%
kg packed per worker	94	kg/shift
Total kg packed per shift (20 workers)	1,875	kg/shift
Cost of labour per kg packed	0.32	F\$/kg packed
Packaging Costs:		
Cartons 40cm x 30cm x 33cm = 40 Litres	40	Litres
kg of okra per carton	15	kg
Cost of carton and plastic liners	1.80	F\$/carton
Cost of carton and plastic liners per kg packed	0.12	F\$/kg packed
Other Packhouse Costs (per shift):		
Supervisor/foreman	50	F\$/shift
Electricity and water	200	F\$/shift
Depreciation: F\$350,000 over ten yrs, 150 shifts/yr	233	F\$/shift
Other costs per kg packed	0.26	F\$/kg packed

Table H-32 Cost of transport and quarantine clearance: Okra

Exchange rate: F\$ per A\$	1.87	
Air freight Nadi-Sydney a/	1.70	F\$/kg shipped
AQIS inspection in Sydney	1,400	A\$/shipment
AQIS inspection in Sydney	2,618	F\$/shipment
kg per shipment	2,000	kg
AQIS inspection in Sydney	1.31	F\$/kg shipped
Total cost of transport and quarantine clearance	3.01	F\$/kg shipped

a/ Includes all documentation and customs clearance fees

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Table H-33 Sales revenue through Sydney wholesale market: Okra

	Price Range		
	High	Medium	Low
Wholesale price (A\$/kg)	6.00	5.00	4.20
Less allowance for 10% losses	0.60	0.50	0.42
Price per kg shipped (A\$/kg)	5.40	4.50	3.78
Price per kg shipped (F\$/kg)	10.10	8.42	7.07
Less wholesale agent's commission (15%)	1.51	1.26	1.06
Net wholesale price per kg shipped (F\$/kg)	8.58	7.15	6.01

Table H-34 Value Chain Analysis: Okra

Farm Production Costs		
Variable costs of production	0.20	F\$/kg collected
Labour costs	0.48	F\$/kg collected
Total farm production costs	0.68	F\$/kg collected
Total production costs (after packhouse losses)	0.91	F\$/kg shipped
Cost of Collection and Transport	0.16	F\$/kg collected
Total collection and transport costs	0.21	F\$/kg shipped
Packhouse Costs		
Labour	0.32	F\$/kg shipped
Packaging	0.12	F\$/kg shipped
Other packhouse costs	0.26	F\$/kg shipped
Total packhouse costs	0.70	F\$/kg shipped
Transport and Quarantine Costs		
Air freight Nadi-Sydney	1.70	F\$/kg shipped
AQIS inspection in Sydney	1.31	F\$/kg shipped
Total transport and quarantine costs	3.01	F\$/kg shipped
Net Wholesale Price (after losses and commissions)		
High price	8.58	F\$/kg shipped
Medium price	7.15	F\$/kg shipped
Low price	6.01	F\$/kg shipped
Total Gross Margin		
High price	3.75	F\$/kg shipped
Medium price	2.32	F\$/kg shipped
Low price	1.18	F\$/kg shipped

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Table H-35 Summary of Value Chain Analysis: Okra

		Wholesale Price		
		High	Medium	Low
Net wholesale price	F\$/kg shipped	8.58	7.15	6.01
Less:				
Production cost	F\$/kg shipped	0.91	0.91	0.91
Collection cost	F\$/kg shipped	0.21	0.21	0.21
Packing cost	F\$/kg shipped	0.70	0.70	0.70
Transport cost	F\$/kg shipped	3.01	3.01	3.01
Gross margin	F\$/kg shipped	3.75	2.32	1.18
Gross margin a/	%	43.7	32.5	19.6

a/ Percent of net wholesale price

Table H-36 Summary of Value Chain Analysis for Pineapple, Chilli, Eggplant and Okra

		Pineapple		
		High	Medium	Low
Net Wholesale Price	F\$/kg	3.00	2.50	2.15
Total Costs	F\$/kg	1.72	1.72	1.72
Gross Margin	F\$/kg	1.29	0.79	0.43
Gross Margin	%	42.9	31.4	20.0

		Long Red Chilli			Birdseye Chilli		
		High	Medium	Low	High	Medium	Low
Net Wholesale Price	F\$/kg	10.30	8.58	7.15	13.73	11.44	9.58
Total Costs	F\$/kg	5.45	5.45	5.45	7.10	7.10	7.10
Gross Margin	F\$/kg	4.85	3.13	1.70	6.64	4.35	2.49
Gross Margin	%	47.1	36.5	23.8	48.3	38.0	25.9

		Eggplant			Okra		
		High	Medium	Low	High	Medium	Low
Net Wholesale Price	F\$/kg	5.15	4.29	3.58	8.58	7.15	6.01
Total Costs	F\$/kg	4.70	4.70	4.70	4.83	4.83	4.83
Gross Margin	F\$/kg	0.45	-0.41	-1.12	3.75	2.32	1.18
Gross Margin	%	8.7	-9.5	-31.5	43.7	32.5	19.6

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