Linking farmers to markets: Improving opportunities for locally produced food on domestic and tourist markets in Vanuatu

A value chain study for chicken and fresh fruits

Report on a study in Vanuatu

April 2014

Sub-regional Office for the Pacific Islands
Linking farmers to markets: Improving opportunities for locally produced food on domestic and tourist markets in Vanuatu

A value chain study for chicken and fresh fruits

Report on a study in Vanuatu

April 2014

The designations employed and the presentation of material in this report do not imply the expression of any opinion whatsoever on the part of the Food and Agriculture Organization of the United Nations concerning the legal or development status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. The mention of specific companies or products of manufacturers, whether or not these have been patented, does not imply that these have been endorsed or recommended by FAO in preference to others of a similar nature that are not mentioned.

The findings, interpretations and conclusions expressed in this report are those of the authors and do not necessarily represent the views of FAO.
Acknowledgements

The study team undertaking the research and compiling this report included Tim Martyn (FAO Policy Officer), Tuifa’asisina Steve Rogers (Consultant) and Joshua Mael (Consultant).

Many other people have contributed information and ideas that have been fed into the findings in this report. Thanks are extended to all stakeholders in the agriculture and tourism sector that generously provided time and information and shared their ideas with the study team. Particular thanks are extended to Adrea Giacomelli, Jimmy Rantes, Junior Issachar, Vincent Lebot and Andrew McGregor who have willingly provided valuable information and advice on request during the course of this study. Ana Tavoa from the Vanuatu National Statistics Office kindly provided a range of food trade statistics. Finally, thanks are extended to Cynthia Wombur who efficiently organized our meetings in Vanuatu.
## Acronyms and Abbreviations

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACMF</td>
<td>Australian Chicken Meat Federation</td>
</tr>
<tr>
<td>ADB</td>
<td>Asian Development Bank</td>
</tr>
<tr>
<td>AIP</td>
<td>Adventures in Paradise</td>
</tr>
<tr>
<td>Aus</td>
<td>Australia</td>
</tr>
<tr>
<td>CFPL</td>
<td>Chiko Farm Products Ltd.</td>
</tr>
<tr>
<td>CIF</td>
<td>Cash Insurance Freight</td>
</tr>
<tr>
<td>COM</td>
<td>Council of Ministers</td>
</tr>
<tr>
<td>DARD</td>
<td>Department of Agriculture and Rural Development</td>
</tr>
<tr>
<td>DCIR</td>
<td>Department of Customs and Inland Revenue</td>
</tr>
<tr>
<td>DOCs</td>
<td>Day-Old-Chicks</td>
</tr>
<tr>
<td>EPA</td>
<td>Economic Partnership Agreement</td>
</tr>
<tr>
<td>FAO</td>
<td>Food and Agriculture Organisation of the United Nations</td>
</tr>
<tr>
<td>FSA</td>
<td>Farmers Support Organisation</td>
</tr>
<tr>
<td>GAP</td>
<td>Good Agricultural Practices</td>
</tr>
<tr>
<td>GDP</td>
<td>Gross Domestic Product</td>
</tr>
<tr>
<td>HACCP</td>
<td>Hazard Critical Control Point</td>
</tr>
<tr>
<td>IFC</td>
<td>International Finance Corporation</td>
</tr>
<tr>
<td>ISO</td>
<td>International Standards Organisation</td>
</tr>
<tr>
<td>MALFFB</td>
<td>Ministry of Agriculture, Livestock, Forestry, Fisheries, and Biosecurity</td>
</tr>
<tr>
<td>MTTCNVB</td>
<td>Ministry of Tourism, Trade, Commerce, and Ni-Vanuatu Business</td>
</tr>
<tr>
<td>MCA</td>
<td>Millennium Challenge Account</td>
</tr>
<tr>
<td>MFN</td>
<td>Most Favoured Nation</td>
</tr>
<tr>
<td>MSG</td>
<td>Melanesian Spearhead Group</td>
</tr>
<tr>
<td>NGO</td>
<td>Non-Governmental Organisation</td>
</tr>
<tr>
<td>NZ</td>
<td>New Zealand</td>
</tr>
<tr>
<td>OPSP</td>
<td>Overarching Productive Sector Policy</td>
</tr>
<tr>
<td>PACER</td>
<td>Pacific Agreement on Closer Economic Relations</td>
</tr>
<tr>
<td>PICTA</td>
<td>Pacific Island Countries Trade Agreement</td>
</tr>
<tr>
<td>PISC</td>
<td>Poultry Industry Steering Committee</td>
</tr>
<tr>
<td>PV</td>
<td>Port Vila</td>
</tr>
<tr>
<td>SAPV</td>
<td>Syndicat Agricol et Pastoral de Vanuatu</td>
</tr>
<tr>
<td>SPC</td>
<td>Secretariat of the Pacific Community</td>
</tr>
<tr>
<td>VAT</td>
<td>Value Added Tax</td>
</tr>
<tr>
<td>VNSO</td>
<td>Vanuatu National Statistics Office</td>
</tr>
<tr>
<td>vt</td>
<td>Vatu</td>
</tr>
<tr>
<td>VUV</td>
<td>Vatu</td>
</tr>
<tr>
<td>WTO</td>
<td>World Trade Organisation</td>
</tr>
<tr>
<td>WTTC</td>
<td>World Travel and Tourism Council</td>
</tr>
</tbody>
</table>
Table of Contents

Acknowledgements.................................................................................................................. 2

Acronyms and Abbreviations.................................................................................................. 3

Executive Summary.................................................................................................................. 5

1. Introduction ......................................................................................................................... 7

2. Economic context of Agriculture and Tourism sectors ......................................................... 9

3. Study Methodology.............................................................................................................. 12

4. Opportunities and constraints in the chicken value chain .................................................. 13
   4.1. The Vanuatu poultry sector .......................................................................................... 13
   4.2 Chicken imports and potential for substitution.............................................................. 17
   4.3 Improving Competitiveness of the local poultry industry .............................................. 19
   4.4 Other factors related to increasing efficiency, competitiveness, and sustainability of chicken value chains .................................................................................................................. 24
   4.5 Potential market value of chicken industry development to Vanuatu ......................... 28
   4.5 Summary Matrix of issues and responses in the chicken value chain ......................... 30

5. Opportunities and constraints in fresh fruits value chain linkages with the tourism sector ... 31
   5.1. Market Demand .......................................................................................................... 31
   5.2. Local fruit production ................................................................................................. 34
   5.3. Marketing of local fruit to the tourist sector ................................................................. 36
   5.4. Building market demand for local produce ................................................................. 39
   5.5. Cruise ship and day-visitor market ............................................................................. 40
   5.6. Other factors impacting the fruit supply chain ........................................................... 42
   5.8 Summary Matrix of issues and responses in the fresh fruit value chain ...................... 45

6. Conclusions and Recommendations .................................................................................. 46

Annex 1: Partial Budget for smallholder layer enterprise with 40 hens .................................... 48

Annex 2: Chicken feed mixes ................................................................................................. 49

Annex 3: Artificial flower induction in pineapple .................................................................... 53

Annex 4: Tourist Consumer survey ....................................................................................... 54

Annex 5: List of people consulted .......................................................................................... 57

Annex 6: Participants at focus group meetings ....................................................................... 58

References ............................................................................................................................... 59
Executive Summary

Local demand for food and beverage products is rising rapidly in Vanuatu. An expanding urban population, coupled with an increasing number of tourists, has contributed to a growing domestic market for fresh and processed food products. However, much of this demand is being met by imported food. As a result, Vanuatu’s food import bill is rising - reaching VUV5.3 billion in 2012.

The government of Vanuatu has recognized the need to support the development of more competitive domestic supply chains to increase domestic value added from the tourism sector, and reduce their dependence on imported substitutes. In order to achieve this outcome, the Government of Vanuatu needs to facilitate the modernization of the agriculture sector through a supportive policy and institutional environment which encourages private sector investment and innovation. This would then also better position farmers to take more advantage of the linkages with tourism markets.

With the assistance of the Food and Agriculture Organization (FAO), the Ministry of Agriculture, Livestock, Forestry, Fisheries and Biosecurity (MALFFB) have undertaken a review of the technical and policy innovations required to increase the competitiveness of the chicken and fruit (melon, papaya and pineapple) domestic supply chains. These chains were chosen because they present the most significant import substitution potential, because of opportunities for direct substitution; substitution of canned products with fresh alternatives, particularly for the tourism and food hospitality sector; and because they offer opportunities for additional processing and value addition.

Opportunities in the chicken value chain
The poultry sector in Vanuatu is currently comprised of a large number of small-scale farmers primarily focused on limited production of chickens and eggs for own consumption, gifts and occasional cash sales. Low rates of adoption of best practice with regards to chicken housing, feed composition and veterinary care, coupled with high theft rates and poor access to sanitary processing, has undermined the competitiveness of this segment in the supply of formal markets. However it is estimated that with access to improved production technologies and cheaper inputs, the capacity of this sector to meet unmet demand in eggs, ‘bush killed’ and live birds will be improved, with significant income benefits for smallholders.

In recent years, Vanuatu has attracted private sector investment into improving the efficiency of commercial production of broilers and layers focused on the supply of formal domestic markets. However, the high cost of imported feed and Day Old Chicks (DOCs), as well as the poor sanitary conditions of processing, has undermined the competitiveness of local production in the market for frozen whole birds. The value chain analysis in this study has demonstrated that by hatching DOCs locally and using locally milled and prepared feed, the Vanuatu chicken industry can reduce its production costs sufficient to deliver competitively priced chickens for consumption in the domestic and tourist markets. Increased availability of a local supply of hatched DOCs and lower cost feedstock will also benefit smaller scale chicken producers by reducing their production costs, and increase the
profitability of the live chicken and bush killed market segment. Furthermore, the development of a local feed production industry will create new demand for local feed ingredients such as cassava and meat meal. This will offer significant new supply and income generating opportunities for local farmers.

A successful commercial chicken industry based on locally milled feed would mean import substitution savings of foreign exchange up to VUV 149 million and a market for locally grown cassava of at least VUV 28 million. In addition to these direct economic benefits a significant number of jobs will be created in chicken production, cassava production, drying and feed milling. Plus further benefits would also accrue in the smallholder sector through access to cheaper DOCs and feed enabling a substantial increase in their profit margins, as well as the potential to expand production to meet unmet demand.

Opportunities in the fruit value chain
Vanuatu accommodated over 800,000 holiday visitor days in 2012, with most tourists expressing a preference for the consumption of local tropical fruit varieties (melon, papaya and pineapple) during their stay (Annex 4). However the hotel and restaurant market struggles to source a regular high quality supply of local tropical fruits to meet their needs and thus turns to imports, despite the price competitiveness of local production with imported substitutes. Despite a general availability of fresh fruits in Port Vila market outlets, consistent supply of certain fruit types (particularly preferred sweet varieties) of good quality throughout the year remains problematic. As a result, purchasing agents for this segment are often forced to either import fresh produce, or use canned alternatives, in order to satisfy their customers’ preferences. As a result, in 2013 Vanuatu imported fresh melon, papaya and pineapple to the value of more than VUV11 million. A significant reduction in the lost value of these imports could be achieved relatively easily by addressing seasonality in production of pineapple and melons; and through appropriate variety selection for all three fruits in the study.

Small traders provide a critical link between Vanuatu’s small producers and buyers in the hotel and food chain. Traders also play an important service role in ensuring that this sector gets the fresh produce they require at a quality they require, by selecting and grading produce on the basis of quality, and providing produce at varying stages of ripeness in order to enable this sector to meet staggered consumer demand. There is already an established network of farmers and traders servicing the hotel sector in Vanuatu, and focus of government support should be building the capacity of this group to improve their capacity to provide these services to the sector, through the provision of training and inspection services to facilitate the adoption of Good Agricultural Practices (GAP) and HAACP (Hazard Analysis and Critical Control Points) certification.

Building demand from the tourism industry and domestic consumers for locally produced food is also necessary. Including local content and use of local produce in the tourist accreditation program by providing a local content rating system would help serve this purpose. A renewed effort to work with hotel chefs to promote and popularize the inclusion of menu options using additional local ingredients (including fresh fruit juices) should complement this approach. In addition, to ensure that the public and private sector can work collaboratively to reduce the food import dependence of the tourism sector, the Government of Vanuatu should establish a regular forum to forge strategic alliances between hotel chefs/purchasing officers, local suppliers, farmers, government service suppliers, NGOs and other private sector stakeholders.
1. Introduction
The Republic of Vanuatu comprises a chain of some 80 islands, covering a total land area of 12,000 square km. Its population of over 260,000 is largely located in small rural communities; though the share located in its urban centres, now almost 25 percent, continues to grow as young people move in search of income generating opportunities (VNSO 2012).

Households in rural areas derive a majority of their income from subsistence food production, with supplementation from cash crop sales destined for export markets (VNSO, 2013). Vanuatu’s fertile soils and generally favourable climate gives it the potential to produce a wide range of agricultural, forestry and fisheries products. Yet its’ fragmented island geography, susceptibility to severe cyclones, high cost of inputs, complex land tenure systems and inefficient and expensive transport systems, have combined to reduce the potential for achieving scale efficiencies or the security of capital investment required to compete effectively against imported agricultural products. Subsequently Vanuatu’s farmers have been slow to make the transition towards commercial agricultural production, and capitalize on growing domestic demand for food products in urban areas (AusAID, 2007). As a result, Vanuatu has become increasingly dependent upon food imports from Australia, New Zealand and Fiji. The importation of food products is now the second largest of all imported items by category, surpassing imports of fuel or manufactured products. Vanuatu’s 2012 food import bill grew by over VUV522 million over the 2008 figure, to reach more than VUV 5.3 billion in that year (VNSO, 2013). Despite the strength of its subsistence sector, Vanuatu now imports more than 37.7% of its total food consumption.1 The trend towards the consumption of imported food in urban areas, coupled with limited growth in agricultural exports, exacerbates Vanuatu’s trade imbalance and puts pressure on its’ balance of payments.

The growth in international tourism over the last decade has brought significant economic benefits to Vanuatu, with the sector estimated to have contributed VUV 13,753 million to GDP (17.6 %) and directly employed around 10,500 people (15.3% of total employment) in 2012; whilst the wider contribution of the sector to GDP was estimated to be VUV 39,812 million (50.7% of GDP) in 2012, and the total number of jobs supported by tourism 30,500, representing 44.9 percent of total employment (World Travel and Tourism Council, 2013). However the benefits accruing from the tourism industry continue to be eroded by high dollar “leakage” rates as a result of heavy reliance on imported goods and services and repatriation of profits. Furthermore, the foreign domination of parts of the sector and lack of backward linkages has to some extent constrained opportunities for income generation and job creation particularly in rural areas (Scheyvens and Russel, 2013).

1 Using the cereal import dependency ratio formula (Agricultural GDP + Imports – Exports) used by the Food and Agriculture Organisation Food Security Indicators database (http://www.fao.org/economic/ess/ess-fs/ess-fadata/en/#.UyoRkeNJOy4) we calculated Vanuatu’s food import dependence (using imports and exports contained in Vanuatu’s 2011 official trade data for HS codes 1-22). This method resulted in a food import dependency ratio of 0.377
A challenge for policy-makers is to ensure that tourism growth is sustainable and that the economic benefits of this growth are equitably shared between urban and rural communities. Strengthening linkages between the tourism and agriculture sectors would help to increase the value of tourism for the national economy, and for the rural population. Similarly, a key challenge for policy-makers is to improve the linkages between rural producers and the growing urban market. However supplying meat and fresh produce to the tourist market and the modern retail chains common in urban areas, poses a number supply consistency and quality challenges for domestic agricultural producers. In order to supply these sophisticated markets, local producers will need to find profitable and competitive ways to meet new demands for increased volume, quality, regularity and safety requirements.

Capitalizing on these expanding market opportunities will require considerable investment in improved productivity and marketing skills, transport infrastructure and the certification of food processing facilities to ensure that local products meet international quality and food safety standards. Increasing the competitiveness of local produce in these markets will also be dependent on a more enabling policy and regulatory environment and on government’s success in lowering the costs of doing business. Consequently, there is a need for improved public and private sector co-operation in order to identify priority policy and regulatory issues for reform, and to facilitate investment in greater productivity and value chain efficiency.

In order to better define market opportunities and to develop approaches to addressing the constraints faced by local producers accessing these markets the Ministry of Agriculture, Livestock, Forestry, Fisheries and Biosecurity (MALFFB) with assistance from the Food and Agriculture Organization (FAO) have undertaken a study targeting chicken and fresh fruits. These product areas were chosen because they present significant import substitution opportunities; offer opportunities for processing and value addition; and are also important to the tourism food hospitality sector.

For the study a value-chain analysis methodology was used which focused on:

1) Chicken with links to local feed supply.
2) Fresh fruits (melon, papaya and pineapple) supply linkages to the tourist market.

The overall objective of the study was to develop policy action plans to increase access and supply to the domestic market for these products, while placing a particular focus on meeting the demand from tourism hospitality market and thus reducing current import flows.

Following the introduction this report has five additional sections. Section 2 provides a general overview of the economic and policy context for import substitution and linkage of agriculture to the tourism sector. Section 3 briefly describes the approach and methods used in the study. Section 4 investigates and analyses opportunities and constraints in the chicken value chain with linkage to local feed supply. Section 5 looks at the potential to improve and expand local supply of fruits to the tourism industry. Finally, Section 6 concludes and provides some recommendations on policy and strategic actions.
2. Economic context of Agriculture and Tourism sectors

The services sector (dominated by tourism) generated about 66 percent of monetary value to the Vanuatu economy in 2011 compared to 24 percent for agriculture (Fig. 1). Indeed, over the last decade services exports have generated foreign exchange earnings which were around five times higher than those generated by goods (Vanuatu 2012 Trade Policy Framework).

Fig 1: Sector % share of GDP in 2011 at current market prices

![Sector % share of GDP in 2011 at current market prices](image)

*Source: Asian Development Bank Key Indicators for Asia and the Pacific 2013*

Vanuatu’s tourism activities and employment opportunities are primarily located in Port Vila and Luganville, which contributes to the high rate of rural-urban migration and urbanization in the country. The population residing in Port Vila in 2010 was 44,039 and 13,156 in Luganville (VNSO), which represents a significant increase in the proportion of the population residing in urban areas, over the last 20 years (Table 1).

<table>
<thead>
<tr>
<th>Year</th>
<th>1995</th>
<th>2000</th>
<th>2005</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total population '000s</td>
<td>168.4</td>
<td>191.7</td>
<td>217.8</td>
<td>245.4</td>
</tr>
<tr>
<td>Urban population percent of total population</td>
<td>20.2</td>
<td>21.7</td>
<td>23.5</td>
<td>24.4</td>
</tr>
</tbody>
</table>

*Source: Asian Development Bank Key Indicators for Asia and the Pacific 2013*

The expanding urban and tourist populations (Fig. 2) constitute a growing domestic market for fresh and processed food products. However, imported food satisfies an increasing share of this market demand. Food imports valued constituted 20 percent of total imports in 2011 - an increase from 17 percent in 2006 (ADB Key Indicators, 2012).
Vanuatu is a net food importer and continues to run a significant merchandise trade deficit (Figure 3). Indeed the total value of imports was some 5 times greater than the value of exports in 2012 (Figure 3).

As a small open economy, where almost all manufactured goods and increasing amounts of food and fuel are imported, foreign exchange earnings are vital. Strengthening the country’s export performance, increasing import substitution and forming stronger linkages with the growing tourism sector to retain more of the value of each tourist dollar, are recognised as important strategies for reducing balance-of-payment problems and aid dependence in Vanuatu’s Overarching Productive Sector Policy (OPSP) 2012-2017. Vanuatu’s 2012 Trade Policy Framework also recognises the importance of linkages to the primary and agro-industry sectors to improve value adding for urban tourism.

Vanuatu is a member of the WTO and has signed regional trade agreements with the Pacific Island Forum Countries (PICTA) and with the Melanesian Spearhead Group of countries (MSGTA). In addition, trade negotiations are also ongoing on an Economic Partnership Agreement (EPA) with the European Union and on an agreement known as PACER-Plus (Pacific Agreement on Closer Economic Relations) which would seek to include Australia and New Zealand in a reciprocal free trade agreement with the Forum Island Countries. The result of these trade negotiations has been to liberalize tariffs whilst maintaining a higher duty on food products at between 20-30 percent, but the level of this duty still
remains well below the country’s WTO Bounded rates. However, amongst the MSG countries (Fiji, Papua New Guinea and Solomon Islands) all tariffs have now been reduced to zero except for a few exclusions listed in article 9.5 of the MSGTA. In reducing tariffs Vanuatu has to give due attention to protecting the nation’s fiscal revenues, as currently no personal income tax or corporate tax is collected. Since around fifty percent of Vanuatu’s imports originate from Australia and New Zealand, the impact of a PACER-Plus Free Trade Agreement will also have significant consequences for the country’s revenue collection capacity.

Vanuatu’s National Industry Policy and the 2012 Trade Policy Framework both promote performance based import substitution and protection for ‘truly infant industries’. The Government has recognized the chicken industry as a truly infant industry and in a recent Council of Ministers (COM) Decision agreed to provide time-bound protection to the industry by implementing an increase in import duty rates on chicken.

The government has also prioritized work on fresh fruit and vegetables as a specific area for intervention for funding under the European Development Fund (EDF 11) National Indicative Program. Support will aim to increase production, value addition and market access – including linkages with the tourism industry.

---

2 Products excluded from the Agreement are: (a) Chapter 22 – Beverages, Spirits and Vinegar, all products except items described in HS Tariff code 2201,2202,and 2209; (b) Chapter 24 – Tobacco and manufactured tobacco substitutes; (c) Chapter 27 – Mineral fuels, mineral oils and products of their distillation, bituminous mineral waxes; and (d) Cane Sugar HS code 1701 1100.

3 Truly infant industries are described as those with high growth and export potential activities with strong linkages to the primary sector and where process of value addition is still at an initial stage, or has still to be fully explored.
3. Study Methodology

A value chain approach was used for this study. All information collected through stakeholder consultations was analyzed to draw key lessons and make recommendations for action. The study focused on the following questions:

- What are the supply opportunities and constraints facing producers in Vanuatu looking to supply unmet demand for the targeted agriculture products (chicken and fresh fruits) in the domestic market, with a focus on the tourism hospitality market?
- What market, policy, institutional and technical factors affect competitiveness in the chosen value chains vis-à-vis imports?
- What are the dynamics associated with the value chains and what critical conditions are necessary to allow smallholder farmers to take advantage of new opportunities?
- What are the key actions that need to be taken to enhance opportunities for import substitution and strengthen linkages between local agriculture supply chains and the tourism sector?

In order to investigate these questions, the research team gathered empirical information through key informant interviews (using a semi-structured format) with a wide range of agriculture and tourism sector stakeholders. These included farmers, traders, processors and relevant government and NGO personnel (a full list is included at Annex 4). This consultation process was followed by value chain analysis using official national data and data supplied by private sector stakeholders. Field visits/observations were also carried out at farm sites and at processing factories to validate value chain findings. Two roundtable focus group meetings with key stakeholders provided an opportunity to review initial findings and improve recommendations. All primary interviews, field visits and meetings were carried out in the greater Port Vila area during a three week period in February 2014.

---

4 Value chains describe the range of activities involved in creating products and services, analysing and valuing the input-output relationships at all the phases of product transformation between production and final consumption.
4. Opportunities and constraints in the chicken value chain

4.1. The Vanuatu poultry sector

The poultry sector in Vanuatu is currently comprised of a large number of small-scale farmers primarily focused on limited production of chickens and eggs for own consumption, gifts and occasional cash sales. Low rates of adoption of best practice with regards to chicken housing, feed composition and veterinary care, coupled with high theft rates and poor access to sanitary processing, has undermined the competitiveness of this segment in formal markets. However it is estimated that with access to improved production technologies and cheaper inputs, the capacity of this sector to meet unmet demand in ‘bush killed’ and live birds will be improved.

In recent years, Vanuatu has attracted significant private sector investment into improving the efficiency of commercial production of broilers and layers focused on the supply of formal domestic markets. The high cost of imported feed and chicks, as well as the poor sanitary conditions of processing, has undermined the competitiveness of local production in the market for frozen whole birds. The proposed temporary infant industry protection, as well as the local production of inputs critical to reducing costs, offers significant potential for increasing the competitiveness of this sector, and reducing import dependence.

Traditional system

The poultry sector in Vanuatu is largely comprised of small scale free range production focused on meeting subsistence needs, traditional ceremonies, supplemented by occasional cash sales. At the time of the Agriculture Census in 2007, 23,381 households were recorded as keeping chicken with an average of 16 birds per household. The common village fowl that is raised throughout Vanuatu is a cross breed of the bush fowl (*Gallus gallus*) mixed with many other breeds of chicken that have been introduced over the years and dispersed throughout the islands. The result, by natural selection, is a small, hardy bird well adapted to fight, flight and scavenging. In general eggs are left to hatch and rarely collected, the birds scavenge throughout the day and return to roost at night in trees and bushes around their owners’ houses where food scraps are provided to them. This traditional system of subsistence poultry production, with its small hardy fowls, is well attuned to the rhythm and resources of the village environment (Weightman, 1989).

With a reported increasing and unmet demand for live birds on urban markets in Vila and Luganville improving local chicken production by smallholders through use of improved local feed mixes remains a priority for MALFFB’s Livestock Department. With support of the National Agricultural Research Institute (NARI) Papua New Guinea they are experimenting with local feed mixes including cassava with other agriculture bi-products.

---

5 Personal communication, Lonny Bong, Director of Livestock
Smallholder production of eggs and live meat-birds

There are currently 50 or 60 small-holder farmers operating commercial chicken layer and cockerel meat bird production systems on Efate and several other islands including Santo, Malekula, Pentecost and Tanna. Small-holder producers commonly manage flocks of between 50-300 birds, and utilize basic chicken housing, imported day old chicks and depend upon imported feed, supplemented by local inputs. The major challenge to the profitability of these smallholder chicken enterprises is the high upfront costs of establishing suitable chicken housing; and the ongoing costs associated with use of imported chicks and feed. This has led small-holders to look for alternatives, such as the supplementation of imported feed with locally sourced meat meal and copra meal. However this poses some additional challenges to the profitability of the chicken production system, such as slow weight gain; as well as losses resulting from aflotoxin poisoning and the use of improperly processed feed substitutes.

Farm start-up costs include chicken housing built mostly with local bush materials, but with an estimated cost of VUV 25,000 for wire and nails, and also the purchase of chicks and feed. This means an estimated up-front outlay of about VUV 80,000 for an enterprise with 40 birds. As no cash income is made until birds start laying, the upfront costs has to be borne by the farmer in the interim. Some farmers have accessed loan finance through the National Banks ‘Gro Wetem’ or Vanwods microfinance programs to start chicken farms, though the rates of interest charged – reported as between 23 and 28 per cent – place such enterprises at significant risk.

The Farm Support Association (FSA) has provides extension support to assist small-holders to establish chicken farming systems. FSA advises farmers on feeding programs using a mixture of imported feed and local feed materials (including abattoir meat meal and copra meal). The feeds are distributed through Syndicat Agricole et Pastoral de Vanuatu (SAPV) outlets. The FSA program provides advice on husbandry and health and where possible support from the government veterinary service is facilitated when needed. Egg laying begins at 5-6 months and concludes after 18 months when spent birds are harvested for meat (sale price ranges between VUV 500-800 per bird). Cockerels raised for meat can be harvested from 4 months and market prices range from VUV 1,200-1,500 for a good sized rooster. Local market demand for eggs and live birds is deemed to be good6. Logistic and cost challenges are faced in feed distribution to outer islands, particularly where no central feed storage facility is available on island.

SAPV Port Vila and Santo outlets currently provide farmers with chicks [layer hen and cockerel day-old-chicks (DOCs) imported from New Zealand and raised in La Source Farm in Vila]. When needed the chicks, in cartons of 40 birds, are airfreighted (and occasionally sent by sea freight) to outer islands. SAPV charges VUV 400 for layer chicks and VUV 250 for cockerels which includes airfreight cost (Airfreight costs VUV 1,000/carton of birds to all destinations). Distribution of chicks to farmers is

---

6 Personal communication Peter Koah, SAPV – based on discussion with participating farmers
logistically challenging, particularly when sea freighted. A partial farm budget for a smallholder chicken layer enterprise is provided in Annex 2.

**Larger commercial broiler and egg production**

Local commercial production of chicken broilers and eggs has been historically competitive in Vanuatu, though much of the present demand for whole chickens in the formal market – estimated at between 40,000 and 50,000 birds per month – is being met by imported frozen chickens from Australia, New Zealand and Fiji. Challenges to the competitiveness of commercial chicken egg and broiler production, include: the high cost of importing chicks; the high cost of feed; the maintenance of quality chicken housing; and food safety concerns regarding bird processing.

The state-owned Toa broiler and egg production farm linked to smaller contract out-grower farms was sold in 2011 to Chiko Farm Products Limited (CFPL), who subsequently relocated operations to a new 11ha farm site in Teouma, on the outskirts of Port Vila. At the new site substantial investments have been made in new production infrastructure, including hatcheries, layer sheds, broiler houses, an abattoir and freezer/cold storage facilities. Additionally, a feed mill on site with warehouse feed storage facility is planned to be operational in the near future. Future development plans also include a local breeder farm with fertile flock to produce hatching eggs and day old chicks in country. Currently CFPL farms around 19,000 layer hens (producing 15-17,000 eggs/day) and 10,000 broiler birds per month. It has established a target of producing up to 50,000 broiler chickens per month within the next three years. Part of the production model includes contract out-growers to supplement Chiko’s output to meet market demand.

There is one other significant commercial egg producer on Efate (Golden Farm) and one or two smaller farms across the country and a new broiler farm slated to come online shortly in the Port Vila area which will target the local fresh bird market with an anticipated production capacity of 4-5,000 birds per month.

Despite these developments, significant challenges remain to the competitiveness of the commercial chicken production chain. Chicken feed typically represents 70% of the costs involved in chicken production, while the costs of importing day old chicks represent 20% of the cost of chicken production in Vanuatu. Finding cheaper alternative sources of feed is of principal importance to improving the competitiveness of this industry. The availability of local substitutes for the carbohydrate and protein components of chicken feed, and local milling of feeds, offer some potential to reduce the costs of feed. In addition, the cost of day old chicks can be reduced from hatching imported fertilized eggs and eventually, localised fertilized egg production.

A schematic map of the commercial chicken production and supply chains in Vanuatu are depicted in Figure 4 below.
Fig 4: Commercial Chicken Production and Supply Chains in Vanuatu

CONSUMER DEMAND
Estimated formal market demand whole birds = 50,000+/month
Estimated demand for chicken wing and pieces (bird equivalents) = 90,000+/month

Imported fertile flock NZ
Future plan

Imported fertile eggs NZ

Imported DOCs NZ

Imported feed Australia

Chiko Breeding local DOCs
Future plan

(1) Chiko Farm Production

(2-3) Contract growers
Future plan

Chiko Feed Mill
local feed supply
Future plan

FSA Farm (layers & cockerels) DOCs, feed

Local feedstock Copra/meat meal

(50-60) FSA Farmers Group Efate and other islands

Imported chicken 1,800 t in 2013
Aus: 80%
NZ: 12%
Fiji: 8%

Chiko Processing

Chiko Slaughterhouse

Supermarket

Hotel/ Restaurant

Local retail

Live markets

Wholesale

Chiko wholesale/retail shop

Finished Chickens
### 4.2 Chicken imports and potential for substitution

Chicken represents an important target product for import substitution. The volume of chicken imports has doubled over the last decade rising from 866 tonnes in 2002 to 1,928 tonnes in 2012; whilst the value of these imports has tripled from VUV141 million to VUV461 million (Fig 5). Chicken is also a significant demand item for the hotel and restaurant (including fast-food) sector. The total domestic market demand for chicken meat (whole and in cuts) has been estimated by the Department of Trade to be equivalent to around 140,000 chickens a month, with imports currently supplying about 80 percent of this demand. The main source of imports 2009-2011 was: 80 percent from Australia, 12 percent from New Zealand, and 8 percent from Fiji (DCIR).

![Fig 5:Trend in Vanuatu chicken imports](image)

Source: Department of Customs and Inland Revenue (DCIR) data provided by VNSO

However, by far the largest segment of the chicken market demand is chicken cuts, particularly wings which constituted 71 percent of total imports in 2013 (Table 2).

<table>
<thead>
<tr>
<th>Cut</th>
<th>Weight tonnes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wings</td>
<td>1,280 (71%)</td>
</tr>
<tr>
<td>Other cuts</td>
<td>310</td>
</tr>
<tr>
<td>Whole birds</td>
<td>195</td>
</tr>
<tr>
<td>Total</td>
<td>1,785</td>
</tr>
</tbody>
</table>

Table 2: Chicken Imports 2013

As a cheaper chicken cut, wings present a more affordable option for lower income families and whilst the volume of chicken wing imports has been increasing over recent years the volume of whole birds has declined (Fig. 6, linear trend line is in black).
Chicken Value Chain

Figure 7 (following page) shows a construct of the current CFPL commercial chicken production and import value chain. Values have been calculated on a per bird (1.2kg) basis with processing throughput of 35,000 birds per month and a growth cycle of 35 days. This analysis assumes imported DOCs from New Zealand (cost VUV 210) and commercial premixed feed imported from Australia – 10 days (200g) of ‘Starter’; 15 days (1kg) ‘Grower’; and 10 days (2kg) ‘Finisher’ (total cost VUV 220). Slaughterhouse/processing costs of VUV 40 plus a government slaughtering levy of VUV 3 amount to VUV 43. Other production line costs including waste removal, power and wages are estimated to amount to VUV 104. This brings the total production cost to VUV 577 per bird.

The current (2013) CIF import price of frozen whole birds is VUV355 to which a 30 percent import duty is applied bringing the landed price to VUV 460. The wholesale price for chicken is VUV 555 with a supermarket retail price for frozen chicken of VUV 695 (approx. 1.2kg weight) and for whole fresh chickens of VUV 1,020.

Clearly, with this business model domestic production of frozen birds is not financially viable or competitive with imports. However, because of the higher price paid for fresh birds this presents a viable, but limited market where local production has a comparative advantage. Currently there is some uncertainty on the size of this market with estimates ranging from 10 to 24,000 birds per month. Incidentally, the tourism hospitality and restaurant sector shows some preference for fresh birds.

Source: Department of Customs and Inland Revenue (DCIR) data provided by VNSO
4.3 Improving Competitiveness of the local poultry industry

The two most significant costs in commercial chicken production are imported feed and imported DOCs. Reducing other production line costs (e.g. power and waste removal) is important, but reducing the cost of feed and DOCs is seen as critical to developing a competitive business model. Indeed, profitability is seen to hinge on increasing replacement of imported chicken feeds with local feedstock. Increasing productivity
and price competitiveness will also be dependent on better utilization of feed from a nutritional standpoint. Improved nutritional efficiency should increase marketable weights and quality of broilers, both of which are vital to reducing costs and increasing profitability. But the converse is also true, therefore careful formulation and feeding trials of any proposed replacement feeds will be essential.

Chiko already have incubator capacity to hatch fertile eggs to produce locally DOCs, and they intend to further increase this capacity. A feed mill is also planned to be installed on the farm site at Teouma with warehouse storage facility. Therefore, this study investigated opportunities for increasing value chain efficiency by substituting imported DOCs with local hatchlings and imported feed with locally milled and mixed feed with different composition options.

**Locally produced feed**
The major content of chicken feeds (by weight) is a carbohydrate energy source. Most usually this is provided by a grain such as maize (or sorghum), but significant feed development work, particularly in Africa, has also been undertaken using cassava as an alternate feedstock (Hahn, Reynolds and Egbunike, 1998; Ravindran, 2006). This research identifies that cassava is a suitable alternative feedstock, if concerns regarding the ‘bitterness,’ palatability and nutritional content of cassava can be addressed through a process of variety selection, chipping and properly drying, milling into pellets and the addition of protein, fibre and amino acid supplements, can all be achieved.

Recognizing that cassava is grown widely in Vanuatu with reported varieties which have low cyanide content capable of yielding up to 30 tonnes/ha in 10 months or up to 50 tonnes/ha after 18 months growth⁷, cassava was considered to have good potential as an energy component in a local feed mix. Use of cassava in the feed composition would also offer potential for linkages to rural producers, which is a policy priority for the government. The challenge will be to obtain a regular and sufficient supply and ensure that this is efficiently dried. Cassava deteriorates quickly after harvest which requires that drying is carried out relatively close to the farm production site. Effective drying is necessary to prevent growth of moulds and contamination with toxins (e.g. aflatoxin). The water content of cassava is at least 60 percent and high labour and fuel costs should be anticipated in the drying process. Recoverable rate for dry cassava chips is estimated to be around 40 percent. Currently, a local processor is successfully sourcing and drying cassava into chips for milling into flour⁸.

However the high labour and energy costs of processing cassava into chips at the volume required for local feed manufacturing, as well as the relatively high cost of locally produced cassava relative to international cassava prices or relative to alternative sources of carbohydrates (maize, wheat) renders it uneconomic as a feed source unless mixed with other cheaper alternative carbohydrates.

The local market price for fresh cassava is around VUV 45/kg, but can drop to VUV 35 or lower when purchased in bulk quantities. With an addition of 20 percent to cover the costs of drying and processing into chips, this provides a cassava chip price of between VUV 92 /kg (at VUV 35/kg fresh price) and VUV 120/kg (at VUV 45/kg fresh price). This compares unfavourably with the current landed price of ‘grower’ feed, at VUV 80/kg. It also compares unfavourably to an estimated landed cost of imported cassava chips of

---

⁷ Personal communication Vincent Lebot, VARTC Scientist
⁸ Personal communication, Votausi Reur, Lapita Café
VUV 35/kg, or imported maize at VUV27/kg. However there seems some potential for local milling using mixes with a combination of imported grain (maize) and some locally produced cassava chips, in order to provide an additional local market for this root crop. Additional, locally sourced materials such as abattoir meat meal (VUV 16/kg) can be used to top up crude protein content in the feed mix. But at this time, the other essential feed elements - crude fibre (e.g. bran/husks in mill mix) and essential amino acids - would likely need to be sourced from overseas. However, locally produced animal feed could still be significantly cheaper than imported feed, and contribute to significantly reducing chicken production costs for all participants in the chain.

**Value chains for enhanced chicken production business models**

Figures 8 and 9 below depict commercial production and import value chains with two different locally milled and mixed feeds, both models assume locally hatched DOCs and that the new 55 percent duty is applied to chicken imports. The first model uses feed based on imported maize as the carbohydrate source (70% by weight in total feed) milled and mixed with other ingredients locally. The second model uses a maize/cassava (80:20 ratio) as the carbohydrate source (70% by weight in total feed) milled and mixed with other ingredients locally (Table 3).

With the imported maize-based feed the production cost is estimated to be VUV 345-365 per bird (Fig. 8) whereas with the maize/cassava mix feed the production cost is a little higher at VUV389-409 per bird (Fig. 9). Full details of feed composition for the maize/cassava mix are found in Table 3, with other examples of feed mix costs found in Annex 1.

**Table 3: Broiler chicken feed with maize/cassava energy source**

<table>
<thead>
<tr>
<th>Locally produced Broiler chicken feed (grower) using 20% locally produced cassava chips milled with imported maize</th>
<th>Min% 1kg feed</th>
<th>Ingredient cost per kg (VUV)</th>
<th>Ingredient cost per 1kg of feed (VUV)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cassava chips</td>
<td>20</td>
<td>120</td>
<td>24</td>
</tr>
<tr>
<td>maize</td>
<td>50</td>
<td>27</td>
<td>13.5</td>
</tr>
<tr>
<td>Crude Protein %</td>
<td>20</td>
<td>22</td>
<td>4.4</td>
</tr>
<tr>
<td>Crude fibre % max.</td>
<td>6</td>
<td>5</td>
<td>0.3</td>
</tr>
<tr>
<td>Calcium % min.</td>
<td>1</td>
<td>5</td>
<td>0.05</td>
</tr>
<tr>
<td>Total phosphorus %</td>
<td>0.7</td>
<td>100</td>
<td>0.7</td>
</tr>
<tr>
<td>Lysine</td>
<td>1</td>
<td>300</td>
<td>3</td>
</tr>
<tr>
<td>Methionine (% min)</td>
<td>0.3</td>
<td>50</td>
<td>0.15</td>
</tr>
<tr>
<td>TOTAL</td>
<td>100%</td>
<td></td>
<td>VUV46.1</td>
</tr>
</tbody>
</table>
**Fig 8: Value chain with new import duty, local DOCs and locally milled (imported) maize-based feeds**

- **Imported fertilized eggs used to produce DOCs**
  - VUV 90

- **Imported 'starter' and locally produced feed**
  - 10 days of 'Starter' (200g at 84.45vt/kg) = 16.9vt
  - 15 days of 'Grower' (1kg at 30.4vt/kg) = 30.4vt
  - 10 days of 'Finisher' (2kg at 30.4vt/kg) = 60.8vt
  - VUV 108

- **Slaughtering levy**
  - VUV 3

- **Chiko Slaughterhouse / Processing**
  - VUV 20-40

- **Chiko Production Cost**
  - VUV345-365/bird

- **Chiko Frozen Chicken Imports (bird)**
  - CIF – VUV355
  - + new Tariff (55%) – VUV548.7

- **Wholesale Price**
  - VUV555/bird

- **Retail Price**
  - VUV695/chicken (frozen)
  - VUV1020/chicken (fresh)

- **Power, wages and waste removal increased due to incubator and mill costs**
  - VUV124
Slaughtering levy VUV 3

Imported 'starter' and locally produced feed
10 days of 'Starter' (200g at 84.45 vt/kg) = 16.9vt
15 days of 'Grower' (1kg at 44.9vt/kg) = 44.9vt
10 days of 'Finisher' (2kg at 44.9vt/kg) = 89.8vt
VUV152

Chiko Slaughterhouse / Processing VUV 20-40

Power, wages and waste removal increased due to incubator and mill costs VUV124

Frozen Chicken Imports (bird) CIF – VUV355 + new Tariff (55%) – VUV548.7

Chiko Production Cost VUV389-409/bird

RETAIL PRICE VUV695/chicken (frozen) VUV1020/chicken (fresh)

Not Economic Wholesale Price VUV555/bird

Fig 9: Value chain with new import duty, local DOCs and locally milled maize/cassava 80:20 ratio-based carbohydrate used at 70% by weight of the feed
Although the locally milled (imported) maize feed mix option provides the lowest production cost scenario - being about 11% lower than the maize/cassava feed mix option - the use of local cassava does also seem to be a viable option based on the input prices and production line costs used in these calculations. In both cases it is assumed that feed nutritional qualities will be equal to or better than imported feed mixes and thus maintain optimum chicken growth rates. This assumption needs to be researched before a definitive choice of feed composition is made. However, as mentioned above, using local grown feedstock components in the mix should enable positive economic linkages to the rural economy and save on import costs which constitute two important objectives under the government’s “support for infant industries policy”.

An important outcome of the work needed to be undertaken to support chicken import substitution will be to research nutritional quality and price competitiveness of locally milled and mixed feeds and explore technical and economic feasibility of drying cassava at the scale required. These activities are likely to require specialized technical assistance. The government’s Food Technology Development Centre based at Tagabe, with their food testing laboratory facilities, and the Vanuatu Agriculture Research and Training Centre (VARTC) should be valuable partners in this work.

4.4 Other factors related to increasing efficiency, competitiveness, and sustainability of chicken value chains

Policy support for the poultry sector

A recent Council of Ministers Decision (COM Decision 05/2014: Industry Policy Measures for Infant Industry Development in the Poultry Sector) has agreed to instruct the Department of Customs and Inland Revenue to implement increases in import duty on whole chickens and chicken cuts (excluding wings) from anywhere other the Melanesian Spearhead Group (MSG) countries from the current applied Most Favorable Nation (MFN) duty rate of 30 percent to the World Trade Organization (WTO) Bound rate of 55 percent for a period up to three years. The same COM Decision also instructs the Department of External Trade to enter into formal consultations under Article 11 of the MSG Free Trade Agreement of 2005 to seek a three-year increase of duty rates starting from June 2014 to 35 percent for whole chicken imported from MSG member countries and 25 percent, on cuts such as drumsticks, thighs and breasts. Both are proposed to be increased from the current zero percent. The Import Duties Act (CAP 91) is being amended accordingly. This policy support measure is in line with the Vanuatu 2012 Trade Policy Framework which recommends pursuing performance-based import substitution in respect to truly infant industries. It is anticipated that a period of protection from foreign competition will allow the local industry time to improve business models and thus be ready to take over foreign competition after protection is lifted, thus ensuring long-term sustainability of the poultry sector. To ensure smooth implementation and monitoring of the policy a Poultry Industry Steering Committee (PISC) has been established chaired by the Department of Industry. The PISC reports to the National Trade Development Committee for forward transmission to COM. If implementation of the policy is not satisfactory or the poultry industry fails to meet agreed commitments the tariff protection can be discontinued.

---

9 Vanuatu Daily Post, February 14, 2014
Table 4: Whole chicken imports: landed price with calculated impact of a 55 percent duty

<table>
<thead>
<tr>
<th></th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tonnes</td>
<td>297.6</td>
<td>350.9</td>
<td>163.9</td>
<td>194.9</td>
</tr>
<tr>
<td>1.2kg Birds (000s)</td>
<td>248.0</td>
<td>292.42</td>
<td>136.58</td>
<td>162.42</td>
</tr>
<tr>
<td>1.2 kg Birds per month (000s)</td>
<td>20.7</td>
<td>24.37</td>
<td>11.38</td>
<td>13.53</td>
</tr>
<tr>
<td>VUV (millions)</td>
<td>82.0</td>
<td>116.7</td>
<td>49.7</td>
<td>57.5</td>
</tr>
<tr>
<td>VUV per kg</td>
<td>276</td>
<td>333</td>
<td>303</td>
<td>295</td>
</tr>
<tr>
<td>VUV per 1.2kg bird</td>
<td>331.2</td>
<td>399.6</td>
<td>363.6</td>
<td>355</td>
</tr>
<tr>
<td>VUV per imported bird (at current tariff of +30%)</td>
<td>430.56</td>
<td>519.48</td>
<td>472.68</td>
<td>460.2</td>
</tr>
<tr>
<td>VUV per imported bird (at new tariff of +55%)</td>
<td>513.36</td>
<td>619.38</td>
<td>563.58</td>
<td>548.7</td>
</tr>
</tbody>
</table>

Source: Department of Customs and Inland Revenue (DCIR) data provided by VNSO

With the implementation of the higher duty rate imported chicken becomes uneconomic at a wholesale price of VUV 555. Whereas, in both of the example business models with locally mixed feed chicken production costs are sufficiently lowered to deliver birds at a competitive price.

Market factors

The largest segment of the current domestic chicken market is for wing cuts which are imported. The government’s proposal for increased tariffs will not be applied on this trade item which is important in the context of food security. However the duty increase on whole chicken and other cuts, depending on price-elasticity of consumer demand, will likely see some reduced demand for the more expensive whole chicken and other cuts and a possible increased demand for chicken wings. Currently there are no plans to produce bulk chicken wings locally. Indeed, moving to produce wing cuts locally would be difficult as an estimated 41 percent of bird weight is chicken breast (Box 1) and it is doubtful that there would be a large enough ready domestic market for this expensive cut if birds were butchered for wings. This will mean that a significant volume of chicken imports will not be substituted with local product.

A major aim therefore, must be to strengthen and build market demand for local whole chickens and other cuts that can be produced economically. Fresh local chicken already has a strong comparative advantage over imports and a clear preference in some markets, particularly restaurants\(^\text{10}\). With the enhanced business model for local chicken production, using local feed and DOCs, it should be possible to maintain an attractive price for local fresh chicken. Building consumer confidence in the quality, food safety and supply consistency of local chicken produce will also be essential. Chicken is generally recognized as a low fat protein source that also provides a range of other valuable nutrients necessary in a healthy diet. At this time a national campaign promoting local chicken may be warranted.

---

\(^{10}\) Personal communication Sara Kymbrekos, National President, Vanuatu Chefs and Food Handlers Association
Vanuatu beef, marketed as premium grass-fed, has become a ‘flagship’ of Vanuatu quality food products and is recognized as an important selling point in the tourist food hospitality sector. Three chicken production systems are distinguished by the Australian Chicken Industry; conventional, free-range and organic. The differences between these systems are described in Box 2 below. Currently CPFL raises chickens under a conventional production system. It may be worth conducting a market survey of consumer demand, particularly with the tourism industry, to assess the potential marketing advantage (if any) that could be obtained for free-range produced chicken, particularly for the higher value fresh product market.

### BOX 1: Relative proportions by weight of different chicken cuts

<table>
<thead>
<tr>
<th>Mean of 10 carcasses</th>
<th>Total weight in %</th>
<th>Lean meat in %</th>
<th>Skin in %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Half breast raw</td>
<td>41%</td>
<td>49%</td>
<td>33%</td>
</tr>
<tr>
<td>One drumstick raw</td>
<td>17%</td>
<td>18%</td>
<td>12%</td>
</tr>
<tr>
<td>One thigh raw</td>
<td>31%</td>
<td>26%</td>
<td>25%</td>
</tr>
<tr>
<td>One wing raw</td>
<td>12%</td>
<td>7%</td>
<td>31%</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

**Whole Chicken**
Marketed fresh or frozen
Retail price VUV 600/kg frozen

**Split Breast**
A breast quarter with wing removed
Retail price VUV 1,600-1,800/kg fresh

**Whole Chicken Wings**
This is an all-white meat portion composed of three sections; The drumette, mid-section and tip
Retail price VUV 425/kg frozen

*Source: [Australian Chicken Meat Federation website]*
Box 2: Australian Industry Definitions for chicken production systems

<table>
<thead>
<tr>
<th>What are the main differences between conventional, certified free-range and certified organic?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>All meat chickens</strong>, be they conventional, free range or organic, are raised in barns where they can roam freely (this is the current production system at CPFL).</td>
</tr>
<tr>
<td><strong>Free range chickens</strong> have to have access to an outdoor space during the day once they reach 3 weeks of age. They cannot be treated with antibiotics. They have more space available per bird than at conventional chicken farms. They are the same strain of chicken as used in conventional production and they are fed the same feed. They are 35 to 55 days old when harvested, the same age as conventionally raised chickens.</td>
</tr>
<tr>
<td><strong>Organic chickens</strong> are fed only organic feed (no synthetic fertilizer, herbicide or pesticide used in its production). Chicken are given access to an outdoor space during the day after 10 days of age. They cannot be treated with antibiotics. They are provided with more space than conventional and free range chickens. They grow more slowly and are between 65 and 80 days old when harvested.</td>
</tr>
</tbody>
</table>

*Source: Australian Chicken Meat Federation (ACMF) Inc.*

**Regulatory and institutional factors**

The 1991 Meat Industry Act No.5 and the 1992 Meat Industry (Approved Establishments) Regulations No. 12 prescribe the legal and regulatory provisions for the construction of establishments, for the hygiene of establishments, for the slaughtering of animals and poultry; for the health inspection of the animals and the meat of such animals; for the health and hygiene of meat and poultry meat; for the health and hygiene of persons employed in establishments; for the export of meat and poultry meat; for the transport of meat and poultry meat, and for connected purposes. The MALFFB is responsible for administering the Act and implementing the Regulations. The Department of Biosecurity’s Veterinary Officers and Meat Inspectors play the key role in this work.

Public health and safety is of paramount importance within the food industry and attainment of high standards in the commercial production, processing and marketing of chicken products is essential. Best practice dictates that regulatory and service roles should be separated, and therefore, although the Department of Biosecurity should provide relevant advice on hygiene, food safety and biosecurity issues, the training and capacity building for the industry should ideally be conducted by another entity. Currently the Food Technology Centre which is under the auspices of the Ministry of Tourism, Trade, Commerce, and Ni-Vanuatu Business (MTTCNVB) has a limited capacity to do this with some experience in Hazard Analysis Critical Control Point (HACCP) training. However, recognizing the current relatively low level of capacity within the chicken industry sector a more comprehensive animal health program and training in food safety to HACCP/ISO11 standards should be envisaged.

The basic aim of food standards is to ensure that all food offered to consumers is safe to eat. Internationally the current move is for “through chain” standards which cover growing as well as the processing of food and also consider the risk factors in the growing phase that could make the food unsafe for consumption; this can also extend to feed production. In the case of poultry meat, two risk

---

11International Organisation for Standards (ISO) standards, especially ISO 900111 (quality management systems) and ISO 22000 (Food safety management – Requirements for any organisation in the food chain).
factors generally considered as significant are contamination of chicken meat with Salmonella bacteria or Campylobacter bacteria. These bacteria occur naturally and generally do not affect the health of poultry. However some specific strains can, if consumed by people, cause food poisoning. In essence, the measures that are recommended for food safety reasons, to minimize the incidence and spread of microorganisms of public health significance in the production phase, are identical to the biosecurity measures implemented for animal health reasons, i.e. to prevent animal diseases to enter farms or to spread between sheds or farms. Within intensified production environments a high level of vigilance needs to be in practice at all times.

Biosecurity and quarantine are integral parts of any successful poultry production system. Biosecurity refers to those measures taken to prevent or control the introduction and spread of infectious agents to a flock. It is also important that careful attention should be given nationally to biosecurity (particularly at the border) to prevent introduction and spread of any potential disease pathogens (e.g. Newcastle Disease, Avian Influenza, Chicken Bursal Disease etc.). Thorough evidence-based biosecurity pest risk analysis can be a lengthy process, but if done rigorously it should help ensure that chicken products are not imported from countries which pose a risk to the domestic chicken industry. Neighboring countries such as Fiji and Australia have adopted such an approach to protect their domestic industries from such risks. Research into the impact that exclusion of chicken products from biosecurity pathogen disease risk countries, would have on imports of chicken products into Vanuatu and the implications for relations with trading partners, should be commissioned by the Government of Vanuatu’s biosecurity authorities and Department of External Trade

**Biodiversity factors**

Growth in domestic commercial chicken and egg production will inevitably mean an expansion of the numbers of high yielding hybrid bird genotypes sourced from overseas with potential to further dilute the local gene pool. The government has already recognized the need to assess and conserve local poultry breeds and has initiated a chicken biodiversity conservation program located at VARTC in Santo. In the face of potential disease threats and changing climatic conditions, and recognizing the importance of the local hardy breeds in household food security, the chicken biodiversity program is a vitally important program that warrants appropriate support.

4.5 Potential market value of chicken industry development to Vanuatu

If the local commercial chicken industry meet its target production of 50,000 birds per month this will mean an import substitution of chicken equivalent of around 35,000 birds per month or 420,000 birds per year. With a current CIF value VUV 355 per bird this will represent a foreign exchange saving of VUV 149.1 million. If the 50,000 birds are fed on the local cassava based feed mix, with dried cassava representing 20 percent of the energy content (Table 3) then each bird will consume 0.42kg of dry cassava equivalent to 1.05kg of fresh cassava. Therefore 50,000 birds will consume 52.5 tonnes of fresh cassava a month or 630 tonnes a year with a current market value of VUV28.35 million. In addition to this direct market value added a significant number of jobs will be created in chicken production, cassava production, drying and feed milling.
Additional benefits would accrue in the smallholder sector if they have access to cheaper DOCs and feed, which would mean substantial increase in their profit margins. This would make a start-up microfinance loan a far more feasible option.
### 4.5 Summary Matrix of Issues and Responses in the Chicken Value Chain

<table>
<thead>
<tr>
<th>Issue/Constraint</th>
<th>Action</th>
<th>Responsibility</th>
</tr>
</thead>
</table>
| High cost of imported feed makes local chicken production uncompetitive with imports | Substitute imported commercial feed mix with locally milled and mixed feedstock. Establish feed composition and the technical and economic feasibility. Investigate cassava-based feed options. Investigate cassava drying options – technical and economic aspects. | CFPL  
MALFFB  
VARTC  
Department of Livestock  
MTTCNVB  
Food Technology Development Centre  
Department of Industry  
Possible Development Partner support |
| Not achieving consistently food safety standards in commercial chicken industry | Implement a comprehensive animal health and food safety program. Provide training to chicken industry in HACCP/ISO standards. Assist CFPL and contract growers to prepare a Food Safety Management Plan. Prepare a National Farm Biosecurity and Food Safety Manual. | MALFFB  
Department of Biosecurity  
MTTCNVB  
Food Technology Development Centre  
Possible Development Partner support |
| Increased risk of infectious disease spread especially under large scale intensive farming practices | Heightened biosecurity watch and capacity building to industry in biosecurity practices to control potential entry of pathogens to farm production sites. Prepare an emergency response plan in case of disease outbreak. | MALFFB  
Department of Biosecurity  
Department of Livestock |
| Possible increase of imports from Fiji                                             | Negotiate MSG Tariff increase  
Carefully review SPS risks from imports.                                                                                                           | MTTCNVB  
Department of External Trade  
Department of Biosecurity |
| Possible entry of cheap US chicken imports in market                                | Carefully review SPS risks from imports.                                                                                                                                                           | MTTCNVB  
Department of External Trade  
Department of Biosecurity |
| Large share of imports are chicken wings which are a difficult cut to substitute with local production | Drive up consumer demand for local whole chicken and other cuts. Implement a ‘go local’ chicken promotion campaign - Declare a “Year of the chicken”.                                                   | MTTCNVB  
Department of industry  
Vanuatu Chefs and Food Handlers Association  
Chicken Industry Stakeholders |
| Need recognition of small scale production and household production for livelihoods & food security | Extend and increase support program for smaller producers who should also benefit from cheaper source of DOCs and feed.  
Chicken biodiversity conservation program to build resilience against threat of disease and climate change and protect food security. | MALFFB  
Department of Livestock  
FSA/SAPV  
Possible Development Partner support |
5. Opportunities and constraints in fresh fruits value chain linkages with the tourism sector.

This section of the report primarily looks at opportunities and constraints for improving the supply of locally grown fresh fruits (pineapple, papaya and melon) to tourism sector food hospitality outlets.

5.1. Market Demand

The rapid growth in international tourism in Vanuatu and economic potential benefits accruing to the economy was already mentioned in Section 2 of this report. The three main levers affecting the realization of this potential are the number of visitor arrivals, length of stay, and expenditures per day.

**Table 5: Estimated Tourist Spend in Vanuatu in 2012**

<table>
<thead>
<tr>
<th>Segment</th>
<th>Tourists 2012</th>
<th>Average Length of Stay</th>
<th>Average Daily Expenditure VUV</th>
<th>Estimated Total Direct Expenditure VUV Billion</th>
</tr>
</thead>
<tbody>
<tr>
<td>International Air Arrivals</td>
<td>108,161</td>
<td>8.0</td>
<td>13,456</td>
<td>11.6</td>
</tr>
<tr>
<td>Cruise Ship Passengers</td>
<td>213,242</td>
<td>1.0</td>
<td>21,446</td>
<td>4.5</td>
</tr>
</tbody>
</table>

*Source: Vanuatu Strategic Tourism Action Plan 2014-2018, using data based on the 2010 MCA Tourism Survey*

The data in Table 2 was presented in the Vanuatu Tourism Strategic Action Plan 2014-2018. However, data in a more recently released Vanuatu Cruise Visitor Survey (South Pacific Tourism Organization, 2014) indicates a significantly lower level of cruise ship passenger daily expenditure. The survey conducted in 2013 estimated a Port Vila average daily spend per cruise ship visitor of VUV 13,625\(^{12}\) and a Vanuatu-wide (Port Vila and Mystery Island) average daily spend of VUV 10,740. Of this spend, on average, only VUV 1,460 (about US$15) was spent on food and beverages in Port Vila by cruise ship day-visitors. In contrast, informed respondents from the Vanuatu hotel sector, interviewed during the course of this study, estimated that around 25-30% of their revenue comes from their food and beverage sales to guests. Therefore this market segment with some 800,000 visitor days currently offers a higher potential for local food suppliers.

High quality fresh fruit is in demand every day of the year by hotels and resorts in Vanuatu. Fruit and fruit juices are almost universal features of breakfast buffets and menus in Vanuatu. Breakfast is the one meal where hotel restaurants retain a high proportion of their resident guests dining in-house\(^{13}\). But despite a general availability of fresh fruits in Port Vila market outlets, consistent supply of certain fruit types (particularly preferred sweet varieties) of good quality, throughout the year, remains

---

\(^{12}\) This is the amount that benefits the Vanuatu economy (commissions on shore excursions that accrue to overseas operators have been deducted).

\(^{13}\) Personal communication, Thomas Tait, President of the Vanuatu Hotel and Resorts Association
problematic – as one hotel purchasing officer commented, “you can eat banana every day of the year but in our tourist high season it is difficult to find a fresh local pineapple!”. The hotel sector also complains of lack of diversity of local tropical fruits that are regularly available in sufficient quantities throughout the year to meet their demand and inconsistency in quality. Consequently the hotel sector still has a reliance on fresh and processed fruit imports to complement local production when available; and to replace it during the off-season. This is undoubtedly contributing to some degree to the increasing trend in Vanuatu fruit imports (Fig. 10 and Fig. 11).

![Fig 10: Trend in Vanuatu fresh fruit imports](image)

*Source: Department of Customs and Inland Revenue (DCIR) data provided by VNSO*

![Fig 11: Total volume of Vanuatu fresh fruit imports 2008-2012](image)

*Source: Department of Customs and Inland Revenue (DCIR) data provided by VNSO*

However, the main fruits being imported are apples, oranges, pears and grapes, with very much more limited amounts of melons, papaya and pineapples. As shown in Fig 11, during the period 2008-2012 over 664 tonnes of apples were imported whereas the combined weight of melons, papaya and pineapples was only about 63 tonnes. This implies that substituting fruit imports will require both improving supply and marketing of local tropical fruits, and also efforts to increase the consumer demand for Vanuatu’s tropical fruit varieties as opposed to the more common temperate fruit varieties.
currently being imported. Furthermore, recognizing the seasonal patterns of local fruit production and the seasonality in tourism visitor arrivals (Fig 14), it will also be important to work with local fruit growers to address this issue to ensure that desired fruits such as pineapples are available over an extended period of the year.

Fig 12: Air and Day visitors November 2012 to November 2013

Source: adapted from VNSO website

The technology for flower induction in pineapples using plant hormones such as Etherel is well known and quite straightforward and has been tried already in several countries in the region. It is currently being used by farmers in Fiji to extend the pineapple season.

Availability of market data

A significant constraint for government and other stakeholders seeking to strengthen agriculture fresh produce supply to domestic and tourism markets is the absence of a regular and reliable source of market data and information as a basis for planning. With the exception of a few ad hoc market surveys implemented over the last 20 years, which at best have provided a snapshot of the market environment, no data on supply, prices and demand has been collected systematically on a regular basis. Recently, the Vanuatu National Statistics Office (VNSO) has developed a new draft 5-year Statistics Development Plan which identifies the implementation of a regular market survey as a priority. VNSO have conducted a trial ‘market survey’ of the prices and volume of produce for sale at the Port Vila municipal market, and approached FAO for support, in order to enable VNSO and DARD to effectively monitor production and price trends through a regular market survey and report.

At the start of this study there was very limited data available on tourist sector demand for fresh produce. The International Finance Corporation (IFC) had very recently implemented a survey of hotels to assess their demand for food produce and where this was being sourced, either from domestic supply or imports. Unfortunately the output data from this survey was not available at the time of preparing this report.
In lieu of hard data, a guestimate of hotel sector demand for the three fresh fruit products under study was made based on number of visitors, average length of stay, and an assumed quantity of fruit consumed by each visitor. Taking an approximation of 100,000 visitors per year, an average length of stay of 8 days, and an assumed consumption of 2 kg each of pineapple, papaya and melon per person during their stay\textsuperscript{14} the following calculation was made on tourist demand for the three fruit products:

\textit{Guestimate}

\textbf{100,000 tourists for 8 days consume 2kg \textit{papaya} each = 200,000kg per year market volume}

\textit{Average cost of papaya VUV 80 per kg = VUV 16 million per year is the estimated market value}

\textbf{100,000 tourists for 8 days consume 2kg \textit{pineapple} each = 200,000kg per year market volume}

\textit{Average cost of pineapple VUV 150 per kg = VUV 30 million per year is the estimated market value. However fresh pineapple, due to seasonality, currently is only available for around 4-5 months of the year so that the estimated market value could be reduced to around VUV 12 million}

\textbf{100,000 tourists for 8 days consume 2kg \textit{melon} each = 200,000kg per year market volume}

\textit{Average cost of papaya VUV 200 per kg = VUV 40 million per year is the estimated market value. But again this would only be realized if locally grown melon was available year round which currently it is not.}

Clearly, gaining a better understanding of the different market segment demands and the potential to meet these through year-round domestic supply is critical for policy and strategic planning in the agriculture sector, and also for ensuring positive linkages and synergies between the agriculture and tourism sectors. According to the Trade Policy Framework Implementation Matrix Status Report\textsuperscript{15} the Department of Tourism, Department of Industry, Department of Agriculture and Rural Development and the VNSO have finalized a survey questionnaire to determine the consumption patterns of Vanuatu’s hotels and resorts which will be used to provide the information required to establish an agro-tourism program. It will also provide valuable information to domestic producers on the demand patterns of the tourism industry.

\textbf{5.2. Local fruit production}

According to data from the 2007 Agriculture Census melon, papaya and pineapple are grown in provinces across the country (Fig 14). At the time of the survey Shefa Province had the greatest plantings of papaya and melon, with the most southerly Tafea Province also growing significant amounts of melon. In contrast, pineapple plantings were somewhat higher in Samna, Malampa, Shefa and Penema than in the other provinces (VNSO 2008).

\textsuperscript{14} The consumption rate of 2kg per person of the fruits over eight days stay was endorsed as reasonable by the hotel sector stakeholders at the focus group meeting held during consultations in country.

\textsuperscript{15} Prepared by the National Trade Development Committee Secretariat, October 2013
An FAO study in 2011 reported that fresh food produce is supplied into Port Vila municipal market through weekly shipments from other provinces, and daily transport from Efate and the Efate off-shore islands of Moso, Lelepa and Nguna. Fresh produce is also supplied from Vila peri-urban areas such as Teouma, Etas, Airport area and Snake Hill. Whilst other provinces were reported as being a source of taro, yam, sweet potato, and cassava, the supply of vegetables and fruits came mainly (but not exclusively) from farms in Efate. However, the report cautioned that there was not enough information to properly indicate the importance of fresh produce supply from other outer-islands (Mael, 2011). Informed respondents during this current study indicated that melons which are marketed to the tourist sector were sourced from Epi and pineapples and melons were also sourced occasionally from Tanna.

It is estimated that currently up to 50 small farmers in Efate are actively involved in supplying the melon, papaya and pineapple destined for the hotel sector in Vila. For the large part, this fruit is grown in mixed farm gardens with minimal use of mechanization or modern technology, no inorganic fertilizer and there is very limited application of other agricultural chemicals except for some use of the insecticide ‘Attack’ in melon cultivation. At least one farmer visited had adopted an agroforestry alley cropping system using the legume tree *Gliricidia Sepium* to provide nitrogen rich leaf litter mulch for his crops. One commercial trader/processor was providing training and support in Good Agricultural Practices (GAP) to a community of farmers who supplied their business with produce.

No evidence was found of any current practices to extend fruiting seasons (e.g. use of floral induction for pineapples). However application of this technology has the potential to bring significant financial benefits potentially doubling or tripling the value of the current pineapple market, particularly if prices increased during the off-season. Details of pineapple flower induction are included at Annex 3.
At least three varieties of pineapple are being grown, with different eating qualities; several varieties of watermelon are cultivated with seed originating from Japan and New Caledonia. Most of the papayas available on the market are local varieties which are often wild seeded (i.e. planted by birds). Consequently they come in a wide range of sizes and variable taste quality. In contrast, only one commercial farmer in the Vila area was identified who is planting an improved Hawaiian ‘Solo’ variety – he has some 400 trees currently planted and supplies about 400kg of fruit a week mainly to Au Bon Marche supermarkets and a small amount to some resorts at an average price of VUV 100 per kg. The papaya Solo seed is sourced from New Caledonia and Indonesia, but there is some concerns about seed quality and the farmer would thus like to source certified seed from Fiji or produce his own.

Going forward working with the hotel sector and farmers to ensure that preferred fruit varieties with good eating quality are grown will be important. This will also require improvement in seed supply for farmers of the best varieties.

Some of the general production related issues faced by fruit farmers are:

- Lack of affordable finance for improving farm technology/equipment.
- Inadequate information and support on new/improved technologies.
- Availability of quality inputs on a timely basis (e.g. seeds/planting materials, agricultural pesticides).
- Lack of information on issues such as seasonality and how to manage offseason production.
- Lack of feedback from consumers on preferred varieties.
- Theft of farm produce.

5.3. Marketing of local fruit to the tourist sector

**Traders**

Currently a few (3-5) farmer/traders organizes the purchase and supply of fruit products to the bigger Vila hotels and resorts. Typically, they collect orders from the hotel purchasing officers on a weekly basis for delivery the same week. These small operators provide some of the produce themselves from their own farms, but also source from a regular group of farmers they work with. They receive payments on a weekly (sometimes bi-weekly) basis from hotels and pay farmers on a weekly basis. Farmers are thus expected to provide produce upfront without payment (however, small advances are sometimes given). As a result, an existing relationship between traders and farmers, built on trust, is essential to sustain the trade. The traders also sort and grade the quality of the fruit they need to meet the hotel requirements. They thus play an important service by selecting produce on the basis of quality and at varying stages of ripeness to help their buyers respond to a staggered consumer demand. Traders also receive feedback from buyers on varieties, product presentation, and thus can provide the critical link to relay information back to producers on what is needed. The story of one successful trader servicing the hotel and resorts in Port Vila is described in Box 3. Whilst there is one larger commercial trader/processor operating with good facilities for cold storage, the account of the trader described in
Box 3 could be considered typical of other small traders currently servicing the Port Vila hotel and resort sector.

Some of the general issues faced by fruit traders are:

- Cost of hired transport (and shipping costs when incurred).
- Seasonality of supply of key products.
- Variable quality of produce from farmers.
- Poor post-harvest handling particularly during transportation.
- Lack of post-harvest cold storage facilities.
- Lack of feedback from hotels on preferred varieties.
- Some delays in payment.

Box 3: The link between farms and hotels

Susana is a farmer/trader who has worked for 10 years supplying the major hotels and resorts in Port Vila with fruit (pineapple, melon, papaya and banana) up to three times a week. She thus has had long experience in interacting with resorts and hotels, and understands their demands and preferences; as well as having experience of the constraints facing smallholder growers. Her method is to contact hotels usually on a weekly basis to pick up their order sheet indicating the products, quantities and time of delivery. She then visits her network of growers and selects and collects the required quantities and grades needed to fill the order, hires a truck and transports to the hotels. Susanna has managed this business for a decade without a phone or own transport. She has established strong relationships with the purchasing officers at a range of hotels, as well as amongst her network of growers. She pays her growers weekly, and receives payment from her hotels weekly; and therefore receives produce from growers without payment up front (though advances are sometimes provided). Hotels have sought her services because she has ensured good quality and reliability. Susana has a number of competitors, and other ‘aggregators’ have sought to convince the tourism industry to work through them as a wholesale ‘single seller’; though no one had yet managed to monopolise supply in this way, given the diverging loyalties of growers. Once Susana has met hotel demand, if she has any surplus supply, she sells on her own roadside stall where prices received are lower; however she considers supermarkets are a market of last resort, as they pay the lowest rate.

Susana manages her own 10ha farm and began working with surrounding farmers in order to help her co-ordinate supply, and reach the volume required to work with hotels and resorts. Her competitive advantage is that she can procure a volume of produce sufficient to provide a return on a hired vehicle; ensure that the hotels get a higher quality produce than if they went direct to the Vila municipal market; and has developed good relationships with hotels on the basis of her ability to meet the quality and reliability standards demanded by them. Susana also works with growers on other islands particularly in sourcing fruit such as melons from Epi, but significant transport costs are involved in shipping from the outer islands. She would like to improve her business and service to hotels by reducing post-harvest spoilage and waste through having a solar powered container cold storage facility.

Hotel market requirements and purchasing practices

Hotel staff interviewed confirmed a high demand for fresh fruit and most claimed to prefer to buy local, especially fruit. In general, for convenience sake their preference would be for a single source supplier who could reliably provide the volumes required of consistent high quality goods at a competitive price. It was recognized, however, that such a supplier is currently not available in Port Vila. Although purchasing practices vary, most hotels use one or two preferred suppliers, with some direct purchases made at the Port Vila municipal market. Occasional purchases are also made from supermarkets; however this was generally a last resort as prices are deemed to be very high here. The main considerations in selecting a local supplier in order of priority are: reliability, availability of sufficient
volume of quality produce and price. The main challenges that purchasing officers continue to face are: a lack of consistency in supply particularly in relationship to seasonality; a lack of diversity and range of fruits available year round; and a lack of consistency in quality and price. An issue was also raised in relation to the informal business practices used by small traders who do not provide invoices or receipts. This complicates their own business administration and is therefore a disincentive for dealing with this group of traders.

A summary of the general issues faced by hotels/resorts sourcing fresh fruit are:

- Availability and consistency in supply (need for volume).
- Seasonality of supply of key products.
- Inconsistent quality and price volatility.
- Informal business practices used by traders (e.g. no invoice/receipt for accounting VAT tax purposes).
5.4. Building market demand for local produce

Hotel purchasing patterns have a certain number of common elements driven by the quantity and quality demanded versus the local availability and quality, and the price differential between imports against local costs. But there are some important differences in the way establishments carry out their business. Some of the hotel purchasing staff/chefs interviewed during this study had a very strong policy towards purchasing local food produce, but this was not exclusively the case. Among the larger, international chain segment, product purchasing is often influenced by corporate level objectives to obtain economies of scale and achieve consistent quality standards without significant investment of its own staff resources, by using a food logistics company to import all its food needs. Even when local fruits are readily available, some hotels prefer to provide imported fruits such as apples and oranges, as well as processed fruit drinks, instead of local choices. In contrast, medium and smaller hotels can be more flexible in their procurement patterns and are in charge of defining their own purchasing policies. In this case, the manager or purchasing officer/chef’s relationship and involvement with the local community and local food appears to be an important factor on the hotel’s decision to buy local produce. Hotel consumer feedback indicates that guests staying at the top resorts in Port Vila prefer the opportunity to be able to consume local food products – particularly fresh fruit (Box 4). This indicates that offering more local food options on hotel menus would be a significant selling point for Vanuatu, and would complement the country’s already well-established reputation for locally produced beef, and fine dining.

Box 4: TripAdvisor Survey

In order to better gauge the importance hotel customers place on their food experience in Vanuatu, and particularly on local food experiences, a rapid Trip-adviser survey was carried out of the most recent 50 reviews of the Top 20 ranked hotels (of the 47 hotels listed in Port Vila http://www.tripadvisor.com/Hotels-g294144-Port_Vila_Efate-Hotels.html). Of the 933 study considered – or more than 250,000 words of consumer feedback – an found that on an average, each review made four references to food and food products, and almost one in two reviews mentioned specific local foods or food attributes that were important enough for them to include in a hotel review. This is good evidence that a positive local food experience is important to hotel customers and could therefore be one of the defining factors in their choice of hotel. . The full results from the survey are included at Annex 3.

Currently the Department of Tourism, with assistance from IFC, is in the process of developing a national accommodation accreditation system under the Tourism Council Act. Including within this process an accreditation grading system for hotels that buy local products could be worthwhile. As a key driver influencing purchasing behavior of hotels will be the demand for local products by their tourist guests (see Box 3). Participating hotels should also be encouraged to include in their marketing materials information about local purchasing and use of local food in their restaurant menu.
Some of the hotel managerial staff/chefs we interviewed clearly recognized a value in using local produce/food as a point of difference on their menus. The Chantilly’s Hotel, for example, has a strong policy directed to using local produce and has feature local dishes on their restaurant menu. Robert Oliver author of the Me’a Kai Cookbook (The Food and Flavours of the South Pacific) states that to make it work it is necessary to write the farm products right on to menus. Oliver is currently working actively across the region (including in Vanuatu) to change perceptions and attitudes of managers and chefs about the quality and worthiness of Pacific Island local dishes for the hospitality sector. The Vanuatu Chefs and Food Handlers Association, which runs a training course and annual competition for local chefs, has witnessed a strong growth in participation and interest in local food dishes following Robert Oliver’s visit to Vanuatu. This momentum can be capitalized upon by a marketing promotions system for evaluating and rating hotels and restaurants by their use of local food products, among other locally sourced goods and products.

The areas for possible intervention discussed above are fully in line with the priorities and objectives in the Vanuatu Strategic Tourism Action Plan 2014-2018, specifically:

- Priority 4: Address the expectations of tourism markets.
- Objective 4.2: Identify opportunities for import substitution and for increasing the economic contribution from tourism, particularly in agri-tourism.
- Objective 5: product development and standards – to develop quality market focused products that reflect and build on Vanuatu’s natural and cultural features.
- Action 5.3: develop and implement the classification and accreditation programs for all tourism products

5.5. Cruise ship and day-visitor market

Cruise ship tourism is the fastest growing segment in Vanuatu with 213,243 visitor arrivals in 2012 representing 66 percent of tourist arrivals (Fig 16). With cruise ships reported to be getting bigger the numbers are predicted to keep growing in the near future (Neil Linwood, Vice President Carnival Australia, quoted in the Vanuatu Independent issue No. 519, February 22-28, 2014).

Fig 15: Growth in visitor arrivals and percent share arriving by cruise ship and by air

---

16 While most boats currently coming into Port Vila are between 1,000 and 2,000 berths, there were some in 2012 and 2013 with 2,600 berths
Despite the potential size of this market accessing it with local fresh food produce is currently very difficult. To get fresh foods (or indeed any foods) onto the ships as part of their general food provisioning faces mountainous challenges. Some of the barriers include: food quality and safety issues; the need for consistent volume of supply and price.; bulk corporate ordering processes and food loading in Australian home ports (which are only 2-3 days sail away from Port Vila); and Australian farmer and food supplier’s vested interests in continuing this status quo (and their lobbying power on the Australian political scene). Additionally, local Port administration procedures (Customs and Quarantine) and loading of product can reportedly be slow and time consuming in Port Vila, leading cruise ships to prefer not having to source goods locally. Nevertheless, if a cruise ship finds that it is short on any of its original on-board provisions these will be restocked if goods are available in Vanuatu\(^\text{17}\).

The opportunities to market fresh food products, once passengers come ashore, is also limited. Cruise ship holidays typically involve pre-paid packages which include all onboard meals and many onboard activities, discouraging many passengers from consuming additional meals, or spending time, onshore (Scheyvens and Russel, 2013). In general, only around 50-60 percent of onboard cruise passengers disembark while in Port Vila to view the town and go on organized tours. These passengers will normally have eaten breakfast onboard ship and will return to the ship before dinner. Hence lunch and other small refreshments and snacks are the main opportunities for food marketing. Fresh fruit such as papaya, melon and pineapple, if prepared in chilled convenience packs, should present an attractive proposition for visitors, particularly those embarking on land and beach tours. However, passengers who embark on formal tours arranged by the P&O cruise ship tour agent ‘Adventures in Paradise’, can only be served food or drinks in at a restricted number of venues which is pre-agreed with AIP. Furthermore, passengers are given advice onboard ship regarding food safety issues and warnings on consumption of certain local products, and advised that they cannot bring fresh food products back on the boat. As a result cruise passengers spend only about 10 percent of their onshore expenditure on food and beverages as compared to 26 percent on imported Duty Free to carry back on board (SPTO, Vanuatu Cruise Visitor Survey, 2014).

To make inroads into the cruise ship market segment with agriculture products, especially fresh food, will take a sustained and concerted effort by sector stakeholders with high level political commitment, advocacy and negotiation with the cruise ship management. Vanuatu government have in 2009 negotiated increased access for ni-Vanuatu to gain employment onboard cruise ships by reducing port dues payable if at least 40 ni-Vanuatu staff are employed amongst the crew on arrival from any place beyond Vanuatu (Ports Act [CAP 26] Ports Dues Fees and Charges Amendment Order No 87 of 2009). With the anticipated continued strong growth in the cruise ship market segment, the goal of increasing local content in the cruise ship value added should rigorously be pursued.

---

\(^{17}\) Personal communication, Barry Amos, South Seas Shipping
5.6. Other factors impacting the fruit supply chain

Access to finance
To improve productivity in fruit production and marketing investment in new technology and farm equipment, post-harvest packaging and cold storage is deemed necessary. Access to credit and financial services to rural areas has improved significantly in recent years particularly through the extended reach of the National Bank of Vanuatu which now operates through 28 branches covering 6 provinces, and the continued growth of the Vanwods Microfinance program for women group saving and lending programs. However, to be sustainable the microfinance lending products provided by these organizations have to maintain very high interest rates (about 23-28 percent) to offset the risks and costs of managing a large number of small loans. This means that small business enterprises which take advantage of this source of credit must have opportunity to generate high margins to enable them to service loans and make a business profit. This source of credit therefore remains out of reach for many in the small farm sector, given low rates of return their enterprises generate and the very real risk of defaulting at such high rates of interest. There is therefore a need to explore more innovative financing mechanisms including possible matching loan with grant programs. For small and medium enterprises and larger investors in the agriculture sector, the loans offered by the Vanuatu Agricultural Bank offer a more manageable rate of interest: 9-17 per cent.

In other Pacific Island countries, the public sector has invested significant effort in reducing the interest rates faced by potential investors in the agriculture sector. Targeted loans have been provided to commercial banks at much reduced rates of interest in order to create specific loan categories designed to attract investment into the agriculture sector. This has enabled commercial banks to offer agricultural investment loans at interest rates of 5-10%, in order to assist local agri-businesses to be competitive with companies in food import destinations by providing loans at the same rates of interest at which they operate. Ensuring cheaper access to finance through the provision of competitive loans to agribusiness investors is a critical policy step towards attracting the investment in modernization necessary to improve the productivity, and competitiveness, of Vanuatu’s agricultural sector. The commission of a more detailed investigation into the major barriers to affordable finance for the agriculture sector, and the loan products and lending methods which have facilitated improved investment in agriculture overseas, should be a short-term objective of the Government of Vanuatu. The Government of Vanuatu should collaborate with one of the overseas development banks in order to implement this research, and work towards introducing the necessary loan products for the Vanuatu agriculture sector.

Inter-island transport
Inefficiencies in Inter-island shipping are widely recognized as a significant impediment to improving supply chain efficiency for agricultural products. Issues include poor frequency of service on some routes, high freight costs, inadequate berthing and loading facilities, as well as poor onboard storage for fresh produce (particularly cold storage). These obstacles result in higher priced and poorer quality products arriving on urban domestic markets, and reduce incentives for outer-island farmers to produce beyond local needs. Consequently, government has prioritized actions targeted to address shipping inefficiencies. The Vanuatu Inter-island shipping project with support from New Zealand and ADB will address infrastructure needs (wharfs, jetties etc.), and pilot subsidization of shipping on uneconomic
inter-island routes. The subsidized routes will be tendered and the best proposal based on price and other quality aspects (such as onboard storage facilities) will be selected. Two initial tenders will cover the southern group of islands in Tafea Provence and the northern Torres Islands and parts of North Santo. Once implemented this program will go some way to alleviating some of the shipping issues mentioned above. However, the program is unlikely to have a significant impact on freight charges for fresh produce from most locations. The destinations to benefit from the subsidy are also not major producers of agricultural produce for marketing to Port Vila or other markets, and therefore will do little to alleviate the high cost of freight for farmers selling their produce to other islands. To address the high freight charges faced by the major agricultural producing islands to the near north of Efate, a more targeted shipping subsidy program should be considered. An approach might be to use a freight voucher system to target groups or individuals who have the capacity to trade and ship significant quantities of fresh produce to urban markets.

Two other issues also impact on efficiency when fresh produce is shipped. The first relates to the freight pricing system and the second to poor post-harvest handling during loading/unloading and transportation. The system for calculating freight charges in Vanuatu is not transparent or predictable for every product. Indeed the charges levied may be based on the volume, weight, packaging, and nature of contents of the freight – or a combination. For example a 40kg sack of copra meal and a 9-10kg local basket of root crops would both cost VUV400-500 to ship to Efate from Santos; whereas a copra sack filled with kava can be charged from VUV1,000 -2,000 depending on the boat and route. One simple technology which may address both these issues for fresh produce such as fruit is to package in plastic field crates for shipping, and charge a flat rate per crate. The crates would hold more volume than a local basket, are much more convenient to carry and can be stacked vertically so as to take up less deck space and volume on board ship. They would also better protect the contents from damage and bruising in transit.

The introduction of a pilot crate freighting system should be explored in order to identify the impact on total freight charges levied on the agriculture sector, and on the freight revenue stream of shipping companies. The Government of Vanuatu could, if this pilot scheme results in a positive outcome for both parties, work with private sector shipping companies to introduce this scheme across all the major shipping routes between islands.

5.7 Conclusions

In summary, support to enhance value chain efficiency for fresh fruit to the tourist sector will need an integrated approach that addresses all three essential aspects of the supply chain: demand, supply and marketing. This will mean focusing on:
1. Building demand for local products by hotels and by the tourists that influence buying behavior of hotels;
2. Improved production and availability of the right varieties through the adoption of good agricultural practices, post-harvest handling; and
3. Strengthening the linkage between production (farmers), traders and the market (hotels and resorts) by supporting product aggregation, quality inspection and delivery capacity to meet increasingly specific market demands.

The key factors affecting linkages between agriculture supply chains and tourism are summarised in Table 3.

**Table 3: Factors influencing the strength and type of linkage between agriculture and tourist markets**

<table>
<thead>
<tr>
<th>Demand related factors</th>
<th>Supply related factors</th>
<th>Market and intermediacy factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Tourism industry maturity, number of visitors, length of stay and daily spend</td>
<td>• Natural resource base; physical limitations on agriculture production</td>
<td>• Policy framework</td>
</tr>
<tr>
<td>• The kind of tourism development; type of visitor, accommodation with respect to ownership, size and class; cruise ships</td>
<td>• The quantity and quality of local production</td>
<td>• Marketing and infrastructure constraints (and transport/ freight costs)</td>
</tr>
<tr>
<td>• The degree of promotion for local cuisine and agriculture processed products and the capacity to use local produce creatively in hospitality kitchens and hotel outlets</td>
<td>• Technical factors related to production</td>
<td>• Supply adjusted to demand (including availability of market data)</td>
</tr>
<tr>
<td></td>
<td>• Spatial and temporal patterns of supply (including seasonality in demand and supply)</td>
<td>• Relationships and communication between chain participants</td>
</tr>
<tr>
<td></td>
<td>• Price competitiveness of locally produced agriculture products</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Technology and processing limitations</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Health and safety standards</td>
<td></td>
</tr>
</tbody>
</table>

Adapted from brief No 3, Business Implementation of Pro-Poor Tourism Series [www.propoortourism.org.uk](http://www.propoortourism.org.uk)
## 5.8 Summary Matrix of issues and responses in the fresh fruit value chain

<table>
<thead>
<tr>
<th>Issue/Constraint</th>
<th>Action</th>
<th>Responsibility</th>
</tr>
</thead>
</table>
| Need to stimulate strong demand for local products from hotel sector and where necessary break existing patterns of purchase of imports. | Include local content and use of local foods in hotel accreditation systems. Provide an appropriate certification rating system for hotels based on local content. Promote local content (foods) as a point of distinction in marketing. Develop a chef-farmer program building on the work of Robert Oliver. | MTTCNVB
Department of Tourism
Tourism Accreditation Committee
Vanuatu Hotel and Resorts Association
Vanuatu Chefs and Food Handlers Association
Possible Development Partner support (IFC, NZ) |
| Farmers lack information and appropriate technology and inputs to meet market demands for availability, consistency in quantity and quality and be price competitive. Poor post-harvest handling (especially by transport operators and ships) and poor packaging. | Strengthen extension support on fruit production, particularly year round production of pineapple and melon, appropriate crop varieties (papaya, melon and pineapple). Provide training in GAP. Facilitate improved input supply – seeds, seedlings and pesticides. | MALFFB, DARD
FSA/SAPV
Possible Development Partner support (EU, FAO, SPC) |
| Limited capacity of traders in formal business practices including product pricing and accounting. | Provide training in post-harvest handling and facilitate use of improved packaging for transport (e.g. plastic field crates) and cold chain facilities. | MALFFB, DARD
FSA/SAPV
Possible Development Partner support (EU, FAO, SPC) |
| Need for better communication between farmers and traders/hotels on what is needed (especially over longer period). | Provide basic business training to farmer/traders operating linkages between agriculture and tourism sector. | MTTCNVB
Department of Industry
Department of Cooperatives and Ni-Vanuatu Business Development Centers
Vanuatu Chamber of Commerce & Industry |
| High transport costs particularly for fresh produce shipped from outer islands. | Facilitate and train in use of mobile telephone applications & ITC for strengthening market information and communication between suppliers and purchasers in the tourism industry. | MTTCNVB
Department of Industry
Vanuatu Chamber of Commerce & Industry |
| Lack of affordable finance for farmers and traders to improve their technologies and equipment. | Subsidized shipping through a competitive tender process (current process for Tanna shipping route). A targeted freight voucher system for fresh produce, and better packaging of produce to reduce freight charges, would help encourage trade from outer islands. Explore more innovative financing mechanisms including possible matching loan with grant programs. | MIPU/VISSP –ADB & NZ
MOF – MALFFB
National Bank, Vanwods, Agriculture Bank
Possible Development Partner support required |
6. Conclusions and Recommendations
Vanuatu is becoming increasingly food import dependent and in order to reduce the impact of this growing trade imbalance on foreign exchange reserves, should renew the focus the efforts of its agriculture sector on increasing its competitiveness in the supply of food products to domestic and tourist markets. The expanding urban domestic market and the growing tourist market offer some good and accessible opportunities for local producers.

Gaining a greater share for local products in these markets will contribute to inclusive economic growth and help counteract the rising flow of food imports. Achieving this will be dependent on modernization of the agriculture sector through a supportive policy and institutional environment which encourages private sector investments and innovation. This would then also better position farmers to take more advantage of the linkages with tourism markets.

Whilst the tourism sector overall has shown good growth over recent years, the fastest growing segment - cruise ship tourism - provides very limited access for local food produce. In contrast, the hospitality sector (hotels and resorts) in general, demonstrate high willingness to increase the share of food products purchased from local origin particularly the produce such as fresh fruit and chicken featured in this study.

Commercial chicken production in Vanuatu faces some challenges to restore its competitiveness in the local market. The key to increasing the competitiveness of small-holder and commercial chicken production is to reduce input costs and upgrade the hygiene, food safety and veterinary standards throughout the supply chain. The two most significant costs factors in Vanuatu chicken production are the costs of importing day-old-chicks (DOCs) and feed. The value chain analysis in this study has demonstrated that by hatching DOCs locally and using locally milled and prepared feedstock production costs can restore the competitiveness of the local chicken industry for consumption in the domestic and tourist markets. Furthermore, opportunity exists to use local ingredients such as cassava and meat meal in the feed mix which should open up supply opportunities for local producers. However, realizing these opportunities depends on the adoption of efficient production and drying systems for cassava in bulk quantities.

A local supply of hatched DOCs and lower cost feedstock would also benefit smaller scale chicken producers to reduce their production costs and increase their profits. Government extension services should therefore ensure that the smallholder sector is fully informed on technology and input developments as they arise. Facilitating access to more affordable loan finance for this sector will also be important to enable them to manage start-up costs and improve quality of housing and hygiene standards.

Producing a consistently high quality of fresh fruit products year round is the biggest challenge that this market faces in the tourist market. The mismatch between supply and demand and lack of intermediary support structures that enable buyers, suppliers and producers to come together to better understand market needs and production capacity, also reduces the capacity of local producers to
supply this market. The Vanuatu Chefs and Food Handlers Association are well placed to take a lead in strengthening demand for local food by leading a forum for stakeholders from the hotels and resorts sector, the trading sector and producers to come together to identify constraints and work together towards their solution. Such a forum will help to forge strategic alliances between all the stakeholders in the local fresh fruit supply chain.

**Significant gains in fruit supply and value added could be achieved by addressing seasonality in production of pineapple and melons and appropriate variety selection for all three fruits in the study.** Appropriate technology is available and should be delivered to fruit farmers through an extension program focused on the adoption Good Agricultural Practices (GAP) and post-harvest management, and ensuring high quality products reach the market.

**There is strong unmet demand for locally produced food in the tourism industry and among domestic consumers, and capitalizing on this demand will help the value of this chain to grow.** Including local content and use of local produce in the tourist accreditation program by providing a rating system would serve this purpose. The survey of Trip-advisor hotel guest reviews undertaken in this study indicated that visitor’s do place a high level of importance on their food experience in Vanuatu.

**In order to gain greater value added from tourism, the agriculture sector should adopt an integrated approach that tackles demand, supply and marketing together.** Such a program should aim to build strategic alliances between hotel chefs/purchasing officers, local suppliers, farmers and service suppliers from government, NGOs and the private sector.

A summary of specific recommended actions for improving efficiency in the chicken value chain and the fruit value chain are included in the matrices at the end of Sections 4 and 5 respectively.
### Annex 1: Partial Budget for smallholder layer enterprise with 40 hens

#### Expenses

<table>
<thead>
<tr>
<th>Feed (supplied by SAPV Vila):</th>
<th>Month 1-6</th>
<th>Month 7-12</th>
<th>Month 13-18</th>
<th>Overall</th>
<th>% share of cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Starter Pellets (2,420vt/20kg)</td>
<td>8 bags</td>
<td>19,360vt</td>
<td>-</td>
<td>-</td>
<td>8 bags 19,360vt</td>
</tr>
<tr>
<td>Meat Meal (1,100vt/50kg)</td>
<td>2 bags</td>
<td>2,200vt</td>
<td>4 bags</td>
<td>4,400vt</td>
<td>4 bags 4,400vt</td>
</tr>
<tr>
<td>Copra Meal (1,700vt/40kg)</td>
<td>6 bags</td>
<td>10,200vt</td>
<td>12 bags</td>
<td>20,400vt</td>
<td>12 bags 20,400vt</td>
</tr>
</tbody>
</table>

**Subtotal**

<table>
<thead>
<tr>
<th>Shipping and Transport:</th>
<th>Month 1-6</th>
<th>Month 7-12</th>
<th>Month 13-18</th>
<th>Overall</th>
<th>% share of cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>To wharf (200vt/bag)</td>
<td>16 bags</td>
<td>3,200vt</td>
<td>16 bags</td>
<td>3,200vt</td>
<td>16 bags 3,200vt</td>
</tr>
<tr>
<td>Ship to island (400vt/bag)</td>
<td>16 bags</td>
<td>6,400vt</td>
<td>16 bags</td>
<td>6,400vt</td>
<td>16 bags 6,400vt</td>
</tr>
</tbody>
</table>

**Subtotal**

<table>
<thead>
<tr>
<th>Chickens (supplied by SAPV Vila):</th>
<th>Month 1-6</th>
<th>Month 7-12</th>
<th>Month 13-18</th>
<th>Overall</th>
<th>% share of cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>400vt/chick (includes transport &amp; vaccination)</td>
<td>40 chicks</td>
<td>16,000vt</td>
<td>-</td>
<td>-</td>
<td>40 chicks 16,000vt</td>
</tr>
</tbody>
</table>

**TOTAL**

<table>
<thead>
<tr>
<th>Overall</th>
<th>Month 1-6</th>
<th>Month 7-12</th>
<th>Month 13-18</th>
<th>Overall</th>
<th>% share of cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>81,360vt</td>
<td>31,760vt</td>
<td>24,800vt</td>
<td>24,800vt</td>
<td>81,360vt</td>
<td>64.5%</td>
</tr>
<tr>
<td>126,160vt</td>
<td>58,360vt</td>
<td>34,400vt</td>
<td>34,400vt</td>
<td>126,160vt</td>
<td>22.8%</td>
</tr>
</tbody>
</table>

Cost of chicken housing (25,000vt for fence wire and nails, all other materials are local) and labour are not included in this budget.

#### Value of Sales

<table>
<thead>
<tr>
<th>Eggs (35vt/egg)</th>
<th>Month 5-6</th>
<th>Month 7-12</th>
<th>Month 13-18</th>
<th>Overall</th>
<th>% share of income</th>
</tr>
</thead>
<tbody>
<tr>
<td>600 eggs</td>
<td>21,000vt</td>
<td>147,000vt</td>
<td>147,000vt</td>
<td>315,000vt</td>
<td>93%</td>
</tr>
<tr>
<td>36* hens</td>
<td>25,200vt</td>
<td>25,200vt</td>
<td>25,200vt</td>
<td>75,600vt</td>
<td>7%</td>
</tr>
</tbody>
</table>

**TOTAL**

<table>
<thead>
<tr>
<th>Overall</th>
<th>Month 5-6</th>
<th>Month 7-12</th>
<th>Month 13-18</th>
<th>Overall</th>
<th>% share of income</th>
</tr>
</thead>
<tbody>
<tr>
<td>21,000vt</td>
<td>147,000vt</td>
<td>172,200vt</td>
<td>340,200vt</td>
<td>340,200vt</td>
<td>93%</td>
</tr>
</tbody>
</table>

*Assumes 10% Attrition rate for birds

#### Income and Expenses

<table>
<thead>
<tr>
<th>Month 1-6</th>
<th>Month 7-12</th>
<th>Month 13-18</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Income</td>
<td>21,000vt</td>
<td>147,000vt</td>
<td>172,200vt</td>
</tr>
<tr>
<td>Expenses</td>
<td>(58,360)vt</td>
<td>(34,400)vt</td>
<td>(34,400)vt</td>
</tr>
<tr>
<td>MARGIN</td>
<td>-37,360vt</td>
<td>112,600vt</td>
<td>137,800vt</td>
</tr>
</tbody>
</table>

**Source:** Adapted from Layer Management for New Farmers Volume 3: Financial Considerations produced by FSA for SAPV
Annex 2: Chicken feed mixes

Prices for feed raw Ingredients

Locally produced cassava chips

- Current market price of fresh cassava = VUV 45/kg
- Equivalent value of dried cassava chips = VUV 99/kg
  (Using fresh market price of VUV45/kg and recovery rate of 40%)
- Cost of processing and drying cassava chips per kg = VUV 21/kg
- Cost of locally produced dried cassava chips per kg (at current market weight) = VUV 120 kg

Imported price for other possible milling feedstock

- Landed cost of imported cassava chips CIF Vanuatu VUV35/kg
- Landed cost of wheat VUV 35/kg (CIF Fiji used because no Vanuatu price available)
- Landed cost of maize VUV 27/kg (CIF Fiji used because no Vanuatu price available)
Example Feed Mix 1:

Locally produced Broiler chicken feed (grower) using locally produced cassava chips instead of maize

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Min% 1kg feed</th>
<th>Ingredient cost per kg (VUV)</th>
<th>Ingredient cost per 1kg of feed (VUV)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cassava chips</td>
<td>70</td>
<td>120</td>
<td>84</td>
</tr>
<tr>
<td>Crude Protein %</td>
<td>20</td>
<td>22</td>
<td>4.4</td>
</tr>
<tr>
<td>Crude fibre % max.</td>
<td>6</td>
<td>5</td>
<td>0.3</td>
</tr>
<tr>
<td>Calcium % min.</td>
<td>1</td>
<td>5</td>
<td>0.05</td>
</tr>
<tr>
<td>Total phosphorus %</td>
<td>0.7</td>
<td>100</td>
<td>0.7</td>
</tr>
<tr>
<td>Lysine</td>
<td>1</td>
<td>300</td>
<td>3</td>
</tr>
<tr>
<td>Methionine (% min)</td>
<td>0.3</td>
<td>50</td>
<td>0.15</td>
</tr>
<tr>
<td>TOTAL</td>
<td>100%</td>
<td></td>
<td>VUV 96.6</td>
</tr>
</tbody>
</table>

- Use locally produced meat meal to top up crude protein
- Need to add additional crude fibre (imported wheat bran/husks from Fiji)
- Crushed shells and coral can be used to top up calcium content
- Need to import essential amino acids and other ingredients
Example Feed Mix 2:

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Min% 1kg feed</th>
<th>Ingredient cost per kg (VUV)</th>
<th>Ingredient cost per 1kg of feed (VUV)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maize</td>
<td>70</td>
<td>27</td>
<td>19</td>
</tr>
<tr>
<td>Crude Protein %</td>
<td>20</td>
<td>22</td>
<td>4.4</td>
</tr>
<tr>
<td>Crude fibre % max.</td>
<td>6</td>
<td>5</td>
<td>0.3</td>
</tr>
<tr>
<td>Calcium % min.</td>
<td>1</td>
<td>5</td>
<td>0.05</td>
</tr>
<tr>
<td>Total phosphorus %</td>
<td>0.7</td>
<td>100</td>
<td>0.7</td>
</tr>
<tr>
<td>Lysine</td>
<td>1</td>
<td>300</td>
<td>3</td>
</tr>
<tr>
<td>Methionine (% min)</td>
<td>0.3</td>
<td>50</td>
<td>0.15</td>
</tr>
<tr>
<td>TOTAL</td>
<td>100%</td>
<td></td>
<td>VUV 31.6</td>
</tr>
</tbody>
</table>

- Use locally produced meat meal to top up crude protein
- Need to add additional crude fibre (imported wheat bran/husks from Fiji)
- Crushed shells and coral can be used to top up calcium content
- Need to import essential amino acids and other ingredients
**Example Feed Mix 3:**

Locally produced Broiler chicken feed (grower) using 20% locally produced cassava chips milled with imported maize

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Min% 1kg feed</th>
<th>Ingredient cost per kg (VUV)</th>
<th>Ingredient cost per 1kg of feed (VUV)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cassava chips</td>
<td>20</td>
<td>120</td>
<td>24</td>
</tr>
<tr>
<td>maize</td>
<td>50</td>
<td>27</td>
<td>13.5</td>
</tr>
<tr>
<td>Crude Protein %</td>
<td>20</td>
<td>22</td>
<td>4.4</td>
</tr>
<tr>
<td>Crude fibre % max.</td>
<td>6</td>
<td>5</td>
<td>0.3</td>
</tr>
<tr>
<td>Calcium % min.</td>
<td>1</td>
<td>5</td>
<td>0.05</td>
</tr>
<tr>
<td>Total phosphorus %</td>
<td>0.7</td>
<td>100</td>
<td>0.7</td>
</tr>
<tr>
<td>Lysine</td>
<td>1</td>
<td>300</td>
<td>3</td>
</tr>
<tr>
<td>Methionine (% min)</td>
<td>0.3</td>
<td>50</td>
<td>0.15</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>100%</strong></td>
<td></td>
<td><strong>VUV46.1</strong></td>
</tr>
</tbody>
</table>

- Use locally produced meat meal to top up crude protein
- Need to add additional crude fibre (imported wheat bran/husks from Fiji)
- Crushed shells and coral can be used to top up calcium content
- Need to import essential amino acids and other ingredients
Annex 3: Artificial flower induction in pineapple

Natural flowering in pineapples varies from year to year in a producing region. Research indicates that natural flowering is linked to the seasonal drop in temperatures which triggers flowering. Dependence on natural flowering can result in serious loss of revenue as seasonal climatic variations cause erratic flowering and varying maturity times. This increases crop management costs and affects the time and quantities of pineapples for sale. Pineapples can be induced to flower and fruit by the use of certain synthetic compounds. The materials used for artificial flower induction all induce the generation of ethylene which acts as a hormone to trigger flowering in the pineapple plant if the plant is physiologically mature.

Artificial flower induction can facilitate better scheduling of harvest because it promotes uniform flowering and maturity in the fruits and increases fruit size and quality. Producers use this practice to:

- Attain uniform maturity; in a mixed planting, ratoon plants and first crop plants can be brought into fruiting with the rest of the crop.
- Control the time of harvest; treatments can be timed to produce a harvest at a predetermined date.
- Avoid overproduction in the peak periods.
- Maximize yields.

Plants are induced when they are on average 8 – 10 months old and at the 30-leaf stage or older. From induction to full maturity takes about 5 months. Applications should take place during the cooler periods of the day e.g. early morning or late afternoon, with preference for the latter. The application is repeated 1 week later to ensure maximum inducement.

The main materials used to induce flowering are Naphthalene Acetic Acid (NAA), calcium carbide and Etherel.

- NAA is available in tablet form and treatment is achieved by placing ½ or 1 tablet into the centre of the whorl of each suitable plant.
- Calcium carbide is used by dissolving a 100 g piece in 5 L water (Plate 30) and, after effervescence has subsided, applying 50 cc to the centre of the whorl of the plant. The solution should be used within 3 hours of mixing.
- Etherel is available in liquid form and is used as a 0.1 - 0.2% spray solution which is applied to the centre of the whorl of the plant.

Annex 4: Tourist Consumer survey

Trip advisor food reviews

In order to investigate the importance of food consumption experiences amongst tourists visiting Vanuatu, we conducted a search of the most recent 50 reviews of Top 20 ranked hotels (of 47 listed in Port Vila) using individual hotels listed at [http://www.tripadvisor.com/Hotels-g294144-Port_Vila_Efate-Hotels.html](http://www.tripadvisor.com/Hotels-g294144-Port_Vila_Efate-Hotels.html)

Results

This research returned 933 reviews of a possible 1000. 19 of 20 top ranked hotels served food, so one was excluded; and 2 of the hotels had received less than 50 total reviews on Tripadvisor. However, the 933 reviews investigated provided more than 250,000 words of customer feedback. We identified common food product and consumption terms and ran a search for the number of instances where this search term was mentioned in the reviews.

The first search run looked for general food references, such as a mention of eating, meal times, meal venues and meal categories: Breakfast, Café, chef, dinner, drinks, eat, eaten, food, fruit, lunch, meat, restaurant.

In the second run we looked for specific foods and food attributes, with a focus on local foods: Pineapple, papaya, watermelon, coconut, juice, smoothie, fruit salad, local food, local ingredients, fresh produce, chicken, beef, steak, seafood

<table>
<thead>
<tr>
<th>Search items</th>
<th>Score</th>
<th>Search items</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breakfast</td>
<td>295</td>
<td>Pineapple</td>
<td>3</td>
</tr>
<tr>
<td>lunch</td>
<td>98</td>
<td>papaya</td>
<td>2</td>
</tr>
<tr>
<td>dinner</td>
<td>175</td>
<td>watermelon</td>
<td>1</td>
</tr>
<tr>
<td>drinks</td>
<td>59</td>
<td>coconut</td>
<td>77</td>
</tr>
<tr>
<td>food</td>
<td>524</td>
<td>juice</td>
<td>17</td>
</tr>
<tr>
<td>fruit</td>
<td>87</td>
<td>smoothie</td>
<td>2</td>
</tr>
<tr>
<td>meat</td>
<td>21</td>
<td>coffee</td>
<td>78</td>
</tr>
<tr>
<td>Café</td>
<td>2</td>
<td>fruit salad</td>
<td>8</td>
</tr>
<tr>
<td>Restaurant</td>
<td>516</td>
<td>local food</td>
<td>7</td>
</tr>
<tr>
<td>Chef</td>
<td>76</td>
<td>local ingredients</td>
<td>2</td>
</tr>
<tr>
<td>Eat</td>
<td>1554</td>
<td>fresh</td>
<td>139</td>
</tr>
<tr>
<td>eaten</td>
<td>19</td>
<td>fresh produce</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>chicken</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td></td>
<td>beef</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td></td>
<td>steak</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td></td>
<td>seafood</td>
<td>40</td>
</tr>
<tr>
<td>TOTAL</td>
<td>3131</td>
<td>TOTAL</td>
<td>452</td>
</tr>
</tbody>
</table>
An average review has almost 4 references to food and food products. Almost 1 in 2 reviews mentioned specific local foods or food attributes that were important enough for them to include in a review.

Below are some examples of specific feedback on local food found in the reviews:

**pineapple**

“. Fresh coconut, mango, watermelon, and oh the taste of the passion fruit and pineapple was out of this world.”

“OMG... the best pineapple I have ever tasted”

“The most stingy continental breakfast I have ever been served in any hotel (for two people), consisting of quarter of an apple, half a slice of pineapple and two miniature bananas, two slices of plain white toast (no other bread ever available), jam and butter (rationed)”

**fruit**

“I just read another review complaining about not getting fresh fruit for breakfast. Maybe something happened on that day as for our entire stay we had a great selection of really fresh fruit, bananas, grapefruit (Vanuatu has the best tasting pomplemousse - French for grapefruit - I've ever tasted) coconut, papaya, and raspberries etc, served up each morning

“Breakfast is included and everything is made to order. I loved the fresh fruit salad and yoghurt and the home made pancakes”

“the breakfast was AMAZING. The time and effort spent into making each fresh fruit platter was just beautiful. Fresh coconut, mango, watermelon, and oh the taste of the passion fruit and pineapple was out of this world.”

**coconut**

“We were welcomed with freshly picked coconut water.. yes in a real coconut, on arrival,..”

“The food was great I had the local fish and prawn in a coconut sauce and my wife had a lovely ham dish.”

**Chicken**

“The food was great. I particularly recommend the chicken curry and the seafood tower.”

“And thank you Marcel, by the way, for the best green chicken curry I have EVER had!”

“the signature dish wood fired cooked chickens, they can also cook in the rotisserie whole pigs”

**Beef**

“The restaurant at the hotel is excellent (the Vanuatu beef was a real highlight)”
“My husband can highly recommend the Organic Vanuatu Beef, he ordered the same dish 3 nights out of 5!”

*Fresh produce*

“The food is all fresh produce which is locally grown have never tasted grapefruit like I tasted in Vanuatu.”

“..the way his eyes lit up when discussing what had just been shipped in to the markets and what he was going with the fresh produce that he had bought. It was so great to get an insight into how a chefs' mind works.”

*Food service*

“They even bring you drinks right onto the beach. On a hot humid day there is nothing better than their fresh lime juice!! So if you are looking for a special place to stay with amazing food and service,..”

“with an hour still to go for breakfast.. I asked for some juice, as the jug was empty and they said once gone, they don't refill it. Holy Moly, is this a joke!! A top resort and they couldn't even supply a decent breakfast for the expense paid.”
Annex 5: List of people consulted

<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abel Tapisuwe</td>
<td>1st Secretary MALFFB</td>
</tr>
<tr>
<td>Alain Jacobe</td>
<td>Farmer/Processor</td>
</tr>
<tr>
<td>Ana Tavoa</td>
<td>Assistant Statistician, Vanuatu National Statistics Office</td>
</tr>
<tr>
<td>Andrea Giacomelli</td>
<td>Senior Trade Advisor, Department of Trade</td>
</tr>
<tr>
<td>Barry Amos</td>
<td>Managing Director South Sea Shipping (Vanuatu) Ltd.</td>
</tr>
<tr>
<td>Bethuel Solomon</td>
<td>DSPPAC Prime Minister’s Office</td>
</tr>
<tr>
<td>Charles Rogers</td>
<td>Farmers Support Association/Syndicat Agricole</td>
</tr>
<tr>
<td>Cornelia Wylie</td>
<td>Vanuatu Direct</td>
</tr>
<tr>
<td>Derek French</td>
<td>1st Political Advisor MALFFB</td>
</tr>
<tr>
<td>Edward Bernard</td>
<td>Senior Program Assistant ILO Country Office for Pacific Island Countries</td>
</tr>
<tr>
<td>Francis Quarani</td>
<td>Director Biosecurity MALFFB</td>
</tr>
<tr>
<td>George Burugu</td>
<td>Director of Tourism Department</td>
</tr>
<tr>
<td>Glenn Niowenmal</td>
<td>Director Chiko Farm Products Ltd.</td>
</tr>
<tr>
<td>Howard Aru</td>
<td>Director General MALFFB</td>
</tr>
<tr>
<td>James Wasi</td>
<td>Head of Extension MALFFB</td>
</tr>
<tr>
<td>Jimmy Adeng</td>
<td>Country Officer International Finance Corporation (IFC)</td>
</tr>
<tr>
<td>Jimmy Rantes</td>
<td>Director Department of Industry</td>
</tr>
<tr>
<td>Jimi Nipo</td>
<td>New Zealand Aid (telephone consultation)</td>
</tr>
<tr>
<td>Joe Nocklam</td>
<td>Farmer/Trader</td>
</tr>
<tr>
<td>John Aruhuri</td>
<td>Head of Rural Banking Services</td>
</tr>
<tr>
<td>Julie Anne Sola</td>
<td>CEO Vanwods Microfinance</td>
</tr>
<tr>
<td>Junior Issachar</td>
<td>Purchasing Officer Chiko Farm Products Ltd.</td>
</tr>
<tr>
<td>Livo Mele</td>
<td>Director of Agriculture MALFFB</td>
</tr>
<tr>
<td>Lonny Bong</td>
<td>Act. Director of Livestock MALFFB</td>
</tr>
<tr>
<td>Mark Nutley</td>
<td>Chicken Farmer</td>
</tr>
<tr>
<td>Nambo Moses</td>
<td>Senior Livestock Officer, MALFFB</td>
</tr>
<tr>
<td>Peter Napwatt</td>
<td>Independent Consultant</td>
</tr>
<tr>
<td>Pierro Bianchesi</td>
<td>Managing Director Vanui Vanilla</td>
</tr>
<tr>
<td>Rebecca Kent</td>
<td>Purchasing Manager, Iririki Island Resort</td>
</tr>
<tr>
<td>Ronnie Jacobus</td>
<td>Chicken Farmer</td>
</tr>
<tr>
<td>Ruth Amos</td>
<td>Manager Food Technology Development Centre, Department of Trade</td>
</tr>
<tr>
<td>Sarah King</td>
<td>IFC</td>
</tr>
<tr>
<td>Sarah Kymbrekos</td>
<td>President Vanuatu Chefs and Food Handlers Association</td>
</tr>
<tr>
<td>Serah Toara</td>
<td>Project Accountant Vanuatu Shipping Support Project (VISSP)</td>
</tr>
<tr>
<td>Sina Moala</td>
<td>Veterinary Officer MALFFB</td>
</tr>
<tr>
<td>Smith Tebu</td>
<td>CEO Vanuatu Investment Promotion Authority</td>
</tr>
<tr>
<td>Stephen Bolton</td>
<td>Senior Advisor Education &amp; Training Australian Chamber of Commerce &amp; Industry</td>
</tr>
<tr>
<td>Susana Sami</td>
<td>Farmer/Trader</td>
</tr>
<tr>
<td>Thomas Tate</td>
<td>President Vanuatu Hotel and resorts Association &amp; Manager Holiday Inn</td>
</tr>
<tr>
<td>Thompson Pakoa</td>
<td>CEO Vanuatu Agriculture Development Bank</td>
</tr>
<tr>
<td>Verena Schmidt</td>
<td>Project Coordinator Pacific Growth and Employment Project</td>
</tr>
<tr>
<td>Vincent Lebot</td>
<td>Scientist Vanuatu Agriculture Research &amp; Training Centre (VARTC)</td>
</tr>
</tbody>
</table>
Annex 6: Participants at focus group meetings

Participants at the fruit value chain focus group meeting on 27 February 2014

Alain Jacobe, (Manager, Tebakor Island Products Limited)
Derek French, (1st Political Advisor MALFFB)
Donald Pelum, (Senior Marketing and Trade Office, Department of Trade)
Fernand Masssing, (Horticulture Officer, Department of Agriculture and Rural Development)
George Boguru, (Director, Department of Tourism)
Mathius Bule, (Agriculture Officer, Department of Agriculture and Rural Development)
Peter Kauh, (Agriculture Officer, Farmer Support Association)
Peter Napwatt, (Independent Consultant)
Rebecca Kent, (Purchasing Manager, Iririki Island Resort)
Roland Cowles, (Secretary, Vanuatu National Chefs Association and Manager Poppy’s on the Lagoon)
Ruth Amos, (Manager, Food Technology Development Centre)
Sarah Kymbrekos, (President, National Chefs Association);
Susana Sami, (Private Farmer/Trader, Teouma)

Participants at the chicken value chain focus group on 28 February 2014

Akaliliu Rensly, (Chiko Farm Products Ltd)
Andrea Giacomelli, (Senior Trade Advisor, MTTICNVB)
Donald Belum, (Market and Trade Officer, Department of Trade)
Glenn Niowenmal, (Director, Chiko Farm Products Ltd)
Harold Stephens, (Second secretary, MALFFB)
Jimmy Rentes, (Director, Department of Industry)
Junior Issachar, (Purchasing Officer, Chiko Farm Products Ltd)
Lonny Bong, (Acting Director, Department of Livestock)
Nambo Moses, (Senior Livestock Officer, Department of Livestock)
Rownie Jacobus, (Chicken Farmer, Teouma Valley)
Voatausi Mackenzie Reur,(Manager, Lapita Café Ltd)
References


Ravindran, V. (2006) Poultry feed availability and nutrition in developing countries, FAO.


59