# FACTORS INFLUENCING AUSTRALIA'S DAIRY PRODUCT EXPORTS TO THAILAND: 1980-2002

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# ABSTRACT

This thesis focuses on an analysis of factors influencing Australia's dairy product exports to Thailand. To the author's knowledge, such an analysis has not been conducted so far. The research consists of literature reviews of the theories and empirical studies of comparative advantage and export demand, the econometric estimation of Thailand's demand for Australia's exports of dairy products to analyse the determinants of Thailand's demand for Australian dairy products, and an investigation of experience of selected Australian exporting companies in exporting dairy products to Thailand based on the interviews of export managers.

Australia exports dairy products such as, milk dry (skim milk powder or SMP and whole milk powder or WMP), butter, cheese and curd, and whey products to Thailand. SMP is the principle ingredient of Thailand's milk processing industry. Australia's main competitors in Thailand for exports of dairy products are New Zealand, the EU and to some extent the U.S.A. Thailand has heavily protected its local dairy industry by high tariffs and regulation. The Thai government promotes local dairy production and the use of local milk products. However, the dairy sector of Thailand is still incapable of meeting the demand from the domestic dairy processing industry and consumers. Hence, Thailand has to import a large volume of dairy products each year.

The Australia-Thailand free trade agreement (FTA) started to operate in January 2005. Thailand's import tariffs on Australia's dairy products will decline to zero to 32 per cent, and be phased out by 2010 or 2020. The quotas on Australia's exports of milk powders and milk and cream to the Thai market will be increased by 2025.

The analysis of revealed comparative advantage and revealed competitive advantage identify that among the dairy product exporting countries, Australia has comparative advantage and competitive advantage of all of the dairy products (milk evaporated, milk dry, whey preserved and concentrated butter and cheese and curd). Thailand has comparative advantage and competitive advantage only in milk condensed and evaporated. Thailand has comparative disadvantage and competitive disadvantage in

the other dairy product categories. Australia's competitors in the Thai market (New Zealand, and the selected EU countries) have comparative and competitive advantages in most of the dairy products. These results suggest that Australian dairy exporting companies and policy makers could focus on increasing the volumes of all of the dairy products exported to Thailand, except *milk condensed and evaporated*.

The results from the estimation of econometric models of Thailand's demand for Australia's exports of *milk dry* shows that in the short run, the quantity of Australia's milk dry exports demanded in Thailand declines when Australia's export price relative to that of competing countries increases, while it is not responsive to Thailand's real national income. In the long run, the quantity of Australia's milk dry exports demanded in Thailand declines when Australia's export price relative to that of competing countries' price increases. The estimated long run price elasticity of export demand is –2.76. In the long run, the quantity of Australia's milk dry exports demanded in Thailand does not change significantly in response to changes in Thailand's real national income.

In the short run, the quantity of Australia's *butter* exports demanded in Thailand falls when Australia's export price relative to that of competing countries increases, but it is not responsive to Thailand's real national income. The quantity of Australia's butter exports demanded in Thailand declines when the Thai baht depreciates against the Australian dollar. In the long run, the quantity of Australia's butter exports demanded in Thailand decreases when Australia's export price relative to that of competing countries' price increases. The estimated long run relative price elasticity of demand is –1.13. In the long run, the quantity of Australia's butter exports demanded in Thailand does not change significantly in response to changes in Thailand's real national income. The quantity of Australia's butter exports demanded in Thailand declines when the Thai baht depreciates against the Australian dollar. The estimated long run exchange rate elasticity of demand is –6.34.

In the short run, the quantity of Australia's *cheese and curd* exports demanded in Thailand is not responsive either to the relative price of exports or to Thailand's real national income. In the long run the quantity of Australia's cheese and curd exports

demanded in Thailand changes significantly in response to changes in Thailand's real national income. The estimated long run income elasticity of demand is 1.84.

During the interviews, the export managers of Australian dairy export companies agreed that Thailand is a significant importer of Australia's dairy products, particularly for SMP, WMP, whey powder, butter and cheese. Thailand's stable economic and political environment is one of the reasons that they are attracted to the Thai market. The principal factors that make Australia's products successful in the Thai market are competitive price and "clean, green and natural" products. However, limited Australian dairy product varieties and distribution channels are major factors that contribute to Australia falling behind New Zealand and the EU in the Thai market. The Australian dairy Corporation (ADC) is not involved in promoting Australian dairy products in the Thai market at present, but has done so in the past. Thailand's tariff and import quota protection and support to local dairying industry is one of the barriers encountered by Australia's exports to Thailand. All the managers are hopeful of expanding opportunities for their dairy exports in the Thai market.

These findings imply that Australian dairy export companies could expand the dairy product varieties they export and offer for sale in the Thai market. They could also take advantage of the established sales distribution network in addition to exploring the possibilities of setting up their own distribution channels. They could be looking into the possibilities of setting up of joint ventures with local dairy processing companies in Thailand so that their dairy exports could be expanded. The Australian dairy export companies as well as the ADC have to actively promote in various ways the Australian dairy product exports in the Thai market in order to take advantage of the window of opportunities open to them within the trade liberalisation framework of the Australia-Thailand free trade agreement (FTA).

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# DECLARATION

I, Sukij Khorchurklang, declare the DBA thesis entitled 'Factors Influencing Australia's dairy Product Exports to Thailand' is no more than 65,000 words in length, exclusive of tables, figures, appendices, references and footnotes. This thesis contains no material that has been submitted previously, in whole or in part, for the award of any other academic degree or diploma. Except where otherwise indicated, this thesis is my own work.


Sukij Khorchurklang

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# ABBREVIATIONS

| | |
|---|---|
| ABARE | Australian Bureau of Agricultural and Resource Economics |
| ABS | Australian Bureau of Statistics |
| ADC | Australian Dairy Corporation |
| AFG | ASEAN Focus Group |
| AFTA-CER | Australian Free Trade Agreement of A Close Economic Relations |
| AMF | Anhydrous Milk Fat |
| APEC | Asia-Pacific economic Cooperation |
| APFI | Asia Pacific Food Industry |
| ARMA | Autoregressive Moving Average |
| ASEAN | Association of South East Asian Nations |
| AUSTRADE | Australian Trade Commission |
| B.E. | Buddhist Era |
| BMP | Butter Milk Powder |
| BOI | The Board Of Investment of Thailand |
| CER-FTA | A Close Economic Relations Free Trade Agreement |
| CIF | Cost, Insurance and Freight |
| CPD | Co-Operatives Promotion Department |
| DFAT | Department of Foreign Affairs and Trade |
| DHI | Dairy Herd Improvement |
| DLD | Department of Livestock Development |
| DPO | Dairy Farming Promotion Organisation |
| ECM | Error Correction Model |
| EG | Engle-Granger |
| EPI | Export Propensity Index |
| ERA | Effective Rate of Assistance |
| ERP | Effective Rate of Protection |
| ETMs | Elaborately Transformed Manufactures |
| FAO | Food and Agriculture Organisation |
| FOB | Free On Board |
| FTA | Free trade Agreement |
| GATT | General Agreement on Tariffs and Trade |

| | |
|---|---|
| GDP | Gross Domestic Product |
| GNP | Gross National Product |
| GRV | The Gross Receipt Value |
| H-O | Heckscher-Ohlin |
| K | Capital |
| L | Labour |
| LDD | Livestock Development Department |
| ML | Maximum Likelihood |
| MNCs | Multinational Corporations |
| MP | Import Penetration |
| MPI | Import Penetration Index |
| MOAC | Ministry of Agricultural Cooperation |
| MT | Metric Tonne |
| NDM | Non Dry Milk |
| NESDB | National Economic and Social Development Board |
| NESDP | National Economic and Social Development Plan |
| NLD | National Livestock Development |
| NRP | Nominal Rate of Protection |
| NTB | Non-Tariff Barriers |
| OAE | Office of Agricultural Economics |
| OECD | Organisation for Economic Co-operation and Development |
| OIE | Office of industrial Economics |
| OLS | Ordinary Least Squares |
| PPP | Purchasing Power Parity |
| TDI | Thai Dairy industry Co. Ltd. |
| TRIMs | Trade Related Investment Measures |
| TRQ | Tariff Rate Quota |
| TSI | Trade Specialisation Index |
| UCEM | Unrestricted Error Correction Model |
| UHT | Ultra High Temperature |
| UN | United Nations |
| VAR | Vector Autoregression |
| VAT | Value Added Tax |

WMP            Whole Milk Powder

WTO            World Trade Organisation

# Chapter 1

# Introduction

## 1.1 Introduction to the Context of Research

Thailand, located in South East Asia, is a friendly nation of Australia. Thailand and Australia have close bilateral economic relationships, including trade links. In 2001-2002, the value of bilateral trade was around A\$5 billion, and was expanding rapidly (DFAT, 2003a). Thailand was Australia's 12th ranked market for exports of food and agricultural products in 1999. Australia was, on the other hand, Thailand's 3rd ranked supplier of food and agricultural products during 2001-2002 (AUSTRADE, 1998).

Furthermore, Australia has been a major exporter of dairy products to Thailand, specifically for five main dairy products i.e. Whole Milk Powder (WMP), Skim Milk Powder (SMP), Butter, Cheese, and Whey Products (AFG, 1995). During the period 1987-2002, SMP was the major ingredient for local Thai dairy processing industry. Australia exported this product to Thailand at an annual average quantity of 18,808.3 tonnes over this period. WMP and Butter were in the second and third ranked of dairy product exports, amounting to 8,568 and 5,156.3 tonnes, respectively, over the same period. On the other hand, the volume of Whey products and Cheese imported by Thailand from Australia were lower, i.e. 1,530.66 and 600.2 tonnes, respectively (ADC, 1989-2000; 2000-2002). Apart from Australia, other major suppliers of dairy products to Thailand include the European Union (EU), New Zealand and the United States (Preechajarn, 1999-2003).

Australia's export performance is supported by three main factors: favourable geographical location, low cost of transportation, and low cost of exports. However, Australia's volume and market share of dairy product exports in the Thai market had fluctuated substantially during the period 1987-2002 and did not always perform well (ADC, 1992-2000; ADC, 2000-2002). Australia gained an average market share of 21.4 percent in Thailand in 2001-2002 (ADC, 2003b), which was equivalent to an export volume of 13,941.5 tonnes (The Department of Customs, 2002).

Thailand's dairy imports are heavily protected by tariffs and regulation. Due to the end of tariff reduction period in 2004, the Thai import duties have been raised to the range of 5 per cent on WMP and butter oil to 216 per cent on SMP (ADC, 2003b). AFG (1995), AUSTRADE (1998), and Phillips (2000) highlighted Thailand government's decision to use trade barriers consisting of tariffs and non-tariffs. Firstly, the dairy importers have to buy 2 kilograms of local fresh milk for each kilogram of imported milk powders. The importers also have to pay 20 per cent tax and additional value added tax of 10 percent for imported milk. These include 210 per cent tariff on milk and cream, and 33 per cent tariff on cheese (ADC, 2003b).

The Thai government has strongly promoted the production and use of local milk products. At the same time, domestic consumption has grown slowly. Thus, the Thai Ministry of Commerce focuses on utilising an import quota system. The effect of this policy is to restrict Australia's export of dairy products. Additionally, Thai dairy importers must obtain import permits for each shipment prior to the arrival of all dairy products.

The context of this research will be framed to identify the factors that influence Australia's dairy product exports to Thailand. These factors and the experience of the Australian exporters, examined through the interviews of export managers of selected dairy export companies, will be useful in formulating proposals to improve Australia's dairy exports in the Thai market. An overview of the Thai trade policy changes since the 1960s and their impact on Thailand's imports of dairy products will be provided. The trade policy changes that will take place under Australia-Thailand free trade agreement (FTA) and their likely impact on Australia's dairy product exports to Thailand will also be outlined.

## 1.2 Objectives of the Study

The main objective of this study is to investigate factors influencing Australia's dairy product exports to Thailand. This study is based on the conceptual framework of the theories of comparative advantage and demand for exports. The specific aims of this research are as follows:

- To examine Australia's comparative advantage and competitiveness in dairy products, in comparison with Thailand and other major competitors to Australia in the Thai market, using the measures of trade specialisation index (TSI), export propensity index (EPI), import penetration index (MPI), export/import ratio, Balassa's revealed comparative advantage, and Vollrath's revealed competitive advantage;

- To develop and estimate an econometric model of demand for Australia's dairy product exports in Thailand, in order to identify the determinants of exports and to estimate export demand elasticities with respect to relative price, income, exchange rate;

- To review the trade policies of Thailand and to examine their impact on Australia's dairy product exports to Thailand; and

- To examine, through interviews of export managers of selected companies, the experience of and problems encountered in the Thai market by Australia's dairy product exporters.

## 1.3 Significance of Research

Australia's dairy products are exported to Thailand in large volumes each year. This is significant since the EU, New Zealand, and the United States have always been in intense competition with Australia in relation to dairy product exports in the Thai market. This competition resulted in a substantial fluctuation and a slow growth of Australia's dairy product exports to Thailand during 1987-2002. Thailand's dairy product imports are still restricted by trade policy and regulation which adversely affect Australia's and other countries' exports. Therefore, it is important to examine the factors influencing Australia's dairy product exports to Thailand.

This study will focus on making five main contributions. (i) an overview of Australia's dairy products exports to Thailand; (ii) an analysis of Australia's comparative advantage and competitiveness, relative to Australia's main competitors in the Thai market; (iii) an estimation of Thailand's demand for Australia's exports of dairy products; (iv) a review of Thailand's trade policies and their impact on Australia's exports of dairy products to Thailand; (v) an examination of the experience of and problems encountered by Australian dairy product export

companies in exporting to Thailand; and (vi) a provision of suggestions to improve the performance of Australia's dairy product exports in the Thai market.

It is expected that the findings of this research will be beneficial for Australian dairy export companies and policy makers concerned with improving the performance of Australian dairy product exports in the Thai market.

## 1.4 Outline of the Thesis

This thesis is organised into eight chapters as follows:

In chapter 2, Thailand's economic context is reviewed first. This is followed by a description of historical aspects of Thailand's dairy sector. Trends in and policies toward dairy production and consumption in Thailand are discussed next. The last section details the trends and issues in Thailand's imports and exports of dairy products.

Chapter 3 reviews Thailand's trade policies in relation to dairy product imports. The chapter starts with a discussion of historical development of Thailand's trade policy. Then, Thailand and GATT are reviewed including Thailand's dairy industry and policy under the framework of GATT. Thailand in the context of WTO, and in particular Thailand's dairy industry and WTO, are discussed next.

Chapter 4 contains a study of Australia's exports of dairy products with special reference to Thailand. This chapter introduces and discusses Australia's dairy production, and trends in Australia's dairy product exports in general to South East Asia, Middle East and the Americas. The discussion on Australia's exports of dairy products to Thailand consists of two parts. First, Australia - Thailand, economic relationships and the free trade agreement (FTA) are described. Next, Australia's dairy product exports to Thailand are discussed.

In chapter 5, Australia's comparative advantage in dairy products is analysed and compared to that of Thailand and other countries exporting to Thailand. This chapter first provides a review of theory of comparative advantage, Ricardo's theory and Hechscher-Ohlin (H-O) theory. Next, Australia's and Thailand's comparative

advantage in dairy products is investigated using the concepts and measurements of trade specialisaton index (TSI), export propensity index (EPI), import penetration ratio (MP), and export/import ratio (EIR). Balassa's index of revealed comparative advantage (RCA) is then derived for dairy products of Australia, Thailand and a number of other exporting countries. Vollrath's indexes of revealed competitiveness are calculated to identify the competitiveness of dairy products in Australia, Thailand and other exporting countries in the world market.

Chapter 6 contains a study of Thailand's demand for Australia's exports of dairy products. This chapter first provides theoretical background and literature review of the determinants of export demand in order to build the conceptual framework for analysis. The models of Thailand's demand for Australia's dairy product exports are developed and estimated econometrically, using the unrestricted error correction modelling procedure. The short run and long run relationships among the variables are identified, and price, income and exchange rate elasticities are estimated.

Chapter 7 presents the results of interviews with export managers of selected Australian dairy export companies that export dairy products to Thailand. It discusses experiences of and problems encountered by Australian dairy product exporters in exporting to Thailand. The discussion of the results of the interviews is to supplement the findings from econometric modelling in chapter 6.

Chapter 8 provides conclusions, policy implications and limitations of the thesis, and some suggestions for further research in relation to Australia's dairy product exports to Thailand.

# Chapter 2

# An Overview of Thailand's Dairy Industry: Production, Consumption and Trade

## 2.1 Introduction

The purpose of this chapter is to provide an overview of the structure of the dairy industry in Thailand. The overview focuses on the trends in Thailand's production, consumption, and imports and exports of dairy products. Section 2.2 describes Thailand's economic context. The historical aspects of the dairy industry in Thailand are described in Section 2.3, which includes an historical account of the Thai government's "school milk' campaign aiming at the stimulation of domestic consumption of milk. The discussion of consumption and production of dairy products in Thailand appears in Sections 2.4 and 2.5. Thailand's imports and exports of dairy products are described in section 2.6, followed by conclusion in Section 2.7.

## 2.2 Thailand's Economic Context

In the 1980s, Thailand enjoyed a period of rapid economic growth. As shown in Figure 2.1, real gross domestic product (real GDP) grew at an average annual rate of 13.05 per cent during 1980-1990. Over the same period, Thailand's growth inclined towards industrialization as the share of industry in GDP peaked at 27.3 per cent in 1990 (see Tables 2.1 and 2.2). In comparison, agricultural sector output increased slowly from 1.9 per cent in 1980 to 5.5 per cent in 1984, but rapidly increased to 12.3 per cent in 1986. Kim and Virasopontaviporn (1989) pointed out that this was a turning point toward an industrial economy in Thailand. The country's real GDP rose sharply at an average growth rate of 20.39 per cent in 1988. These figures were recorded as the highest growth for any economy among the ASEAN countries in the early 1990s (Sheehan, 1993).

**Figure2.1: Growth Rate of Thailand's Real GDP (1980-2001)**
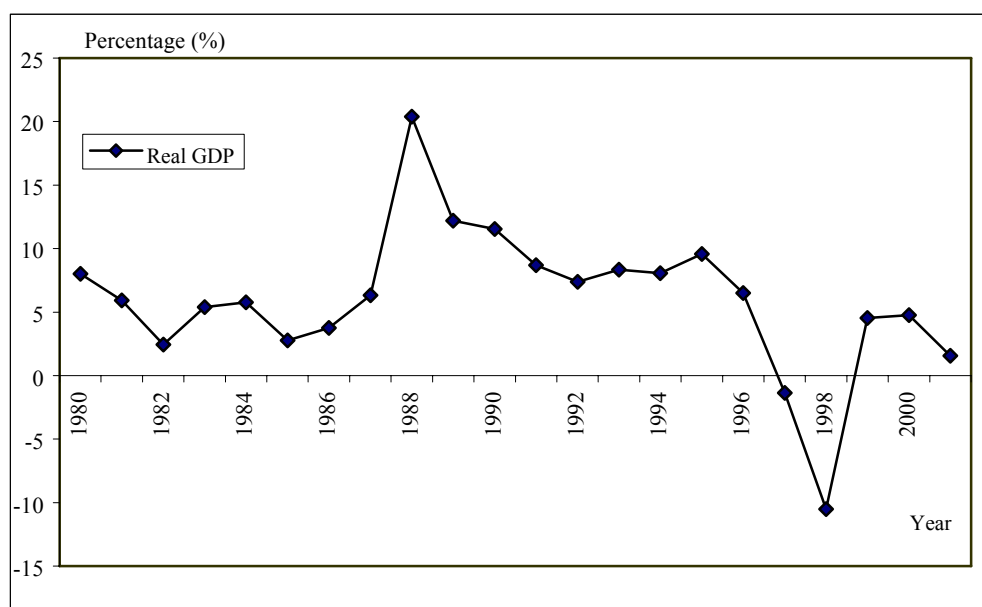


**Source: Bank of Thailand (1985-2001); dXECondata**.

As demonstrated in Table 2.3, Thailand's economy had begun to decline gradually during 1989-1996. In the meantime, Thailand's growth rate of exports of goods and services had increased steadily from 14.37 per cent in 1992 to 23.57 per cent in 1995. However, the growth rate of exports declined sharply to –0.2 per cent in 1997. Thailand's import growth rates have risen steadily from 12 per cent in 1993 to 30.53 per cent in 1995, particularly due to high imports of luxury goods. Domestic investment had also declined since 1990. The growth rate of real GDP was 11.55 per cent in 1990. Furthermore, real GDP growth rate decreased gradually to 9.49 per cent in 1996. The downturn was as a particular result of the crisis in Thailand's financial sector as well as the world economic recession at that time.

During 1997-1998, Thailand had to deal with the financial crisis, which caused its economic growth to deteriorate. Thailand's real GDP growth rate decreased sharply to –10.51 per cent in 1998. Additionally, growth rate of three major sectors of Thailand's economy (agriculture, manufacturing, and services) declined to –3.1 per cent, -11.4 per cent, and -0.4 per cent, respectively (see Table 2.1).

Figure 2.2 shows growth rates of Thailand's import and exports during 1970-2003. There has been positive high growth in exports during 1997-98, but slight negative growth in 1999. There was negative growth in imports in 1998. As shown in Table 2.2, during 1990-1997, Thailand had experienced a prolonged deficit of trade balance. The deficit declined from 11.64 per cent of GDP in 1990 to 1.79 per cent in 1997.

However, in the first quarter of 1999 Thailand's real GDP returned to grow slightly for the first time after the economic crisis of 1997-1998. The real GDP in 1999 was 4.54 per cent higher than that in 1998. Thailand's real GDP during 1999-2000 grew at 4.65 per cent. Thailand's economy grew more positively, as the government focused primarily on the public sector that would create stimulus to economy in 1999 and grew domestic private consumption as well as investment spending in both onshore and offshore. The confidence of the higher growth rate resulted from the government's policy framework that led to a decline in unemployment and lower interest rates. Domestic demand was expected to increase after the crisis. The government authorization to get value added taxes (VAT) reduction in early 1999 stimulated an increase in consumer spending that positively contributed to the nation's GDP in 1999.

**Figure 2.2: Growth Rate of Thailand's Imports and Exports (1970-2003)**



**Source: Bank of Thailand (1973-2000).**

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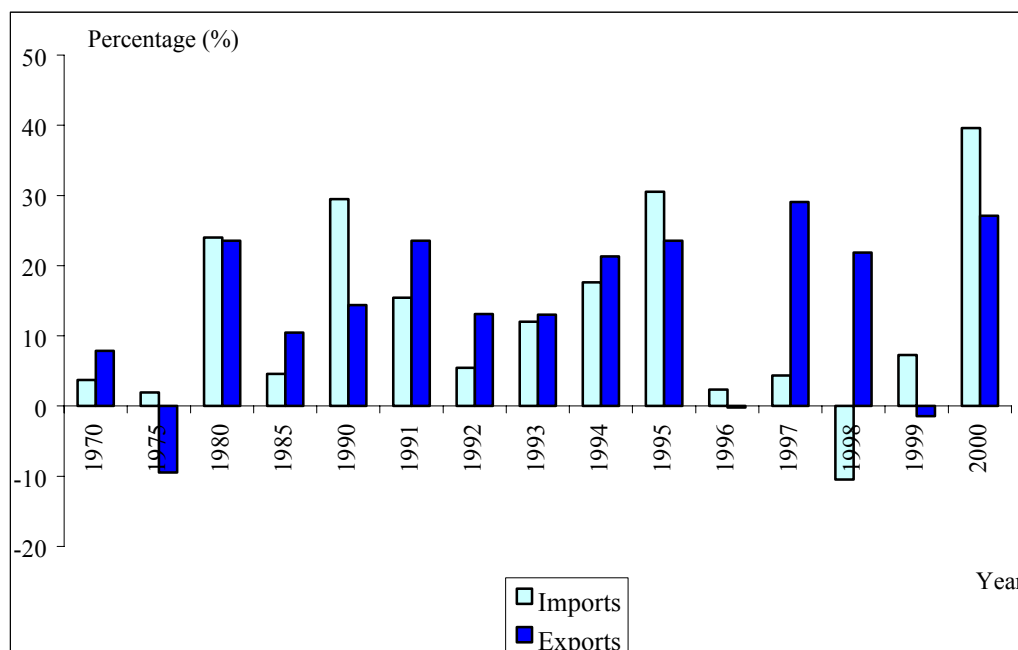
**Table 2.1: Thailand's GDP by Sectors  (1980-1999)**

| Year | Agriculture | | Manufacturing | | Services | |
|---|---|---|---|---|---|---|
| | Value (million baht) | Average Annual Growth in % | Value (million baht) | Average Annual Growth in % | Value (million baht) | Average Annual Growth in % |
| 1980 | 173,806 | 1.9 | 134,515 | 4.8 | 64,443 | 8.3 |
| 1981 | 194,954 | 4.7 | 159,717 | 8.0 | 77,424 | 8.6 |
| 1982 | 188,742 | 1.0 | 164,659 | 4.4 | 89,170 | 8.9 |
| 1983 | 204,443 | 3.8 | 176,200 | 7.3 | 98,980 | 5.4 |
| 1984 | 193,438 | 5.5 | 196,793 | 6.7 | 106,704 | 5.8 |
| 1985 | 182,279 | 2.3 | 207,691 | 2.4 | 115,467 | 5.6 |
| 1986 | 178,140 | 0.3 | 258,644 | 10.8 | 151,072 | 4.8 |
| 1987 | 205,592 | -0.2 | 299,327 | 13.3 | 171,867 | 11.0 |
| 1988 | 252,346 | 16.2 | 403,034 | 25.8 | 207,086 | 13.3 |
| 1989 | 279,690 | 15.1 | 497,053 | 26.8 | 246,248 | 13.3 |
| 1990 | 279,081 | 12.8 | 595,873 | 27.3 | 291,952 | 13.4 |
| 1991 | 321,356 | 12.8 | 706,561 | 28.1 | 324,012 | 12.9 |
| 1992 | 347,965 | 6.1 | 779,093 | 11.3 | 360,029 | 2.4 |
| 1993 | 322,666 | -1.9 | 893,344 | 11.1 | 406,846 | 4.5 |
| 1994 | 377,866 | 4.2 | 1,026,452 | 12.1 | 454,286 | 4.9 |
| 1995 | 454,833 | 3.2 | 1,206,469 | 11.9 | 502,706 | 5.4 |
| 1996 | 510,400 | 3.6 | 1,298,800 | 6.9 | 600,500 | 7.1 |
| 1997 | 531,800 | -0.7 | 1,333,300 | 0.2 | 629,100 | 2.2 |
| 1998 | 586,400 | -3.1 | 1,363,000 | -11.4 | 641,700 | -0.4 |
| 1999 | 517,000 | 2.6 | 1,435,400 | 11.9 | 690,800 | 5.5 |

**Source: Bank of Thailand (1985-2002).**

**Table 2.2: Thailand's International Trade (1980-2002)**

| Year | Imports (c.i.f) | | Exports (f.o.b) | | Trade Balance | |
|---|---|---|---|---|---|---|
| | Value (million baht) | % Growth | Value (million baht) | % Growth | Value (million baht) | % GDP |
| 1980 | 190,025.3 | 24.0 | 132,040.5 | 23.54 | -57,984.8 | -8.46 |
| 1985 | 253,377.3 | 4.56 | 191,709.6 | 10.48 | -61,667.7 | -5.92 |
| 1990 | 838,342.0 | 29.49 | 583,206.3 | 14.37 | -255,135.7 | -11.64 |
| 1991 | 967,808.0 | 15.44 | 720,545.0 | 23.55 | -247,263.0 | -9.81 |
| 1992 | 1,020,582.0 | 5.45 | 815,202.0 | 13.13 | -205,380.0 | -7.26 |
| 1993 | 1,143,108.0 | 12.00 | 921,433.0 | 13.03 | -221,675.0 | -7.00 |
| 1994 | 1,344,831.0 | 17.64 | 1,118,049.0 | 21.33 | -226,782.0 | -6.30 |
| 1995 | 1,755,456.0 | 30.53 | 1,381,660.0 | 23.57 | -373,769.0 | -8.98 |
| 1996 | 1,796,549.0 | 2.34 | 1,378,902.0 | -0.2 | -417,647.0 | -9.05 |
| 1997 | 1,874,598.0 | 4.34 | 1,789,833.0 | 29.08 | -84,765.0 | -1.79 |
| 1998 | 1,677,953.0 | -10.48 | 2,181,082.0 | 21.85 | 503,129.0 | 10.87 |
| 1999 | 1,800,130.0 | 7.28 | 2,150,049.0 | -1.42 | 349,919.0 | 7.54 |
| 2000 | 2,513,467.0 | 39.62 | 2,733,334.0 | 27.13 | 219,867.0 | 4.47 |
| 2001 | 2,752,430.0 | 9.50 | 2,886,794.0 | 5.61 | 134,364.0 | 2.62 |
| 2002 | 2,774,840.0 | 0.81 | 2,923,940.0 | 1.28 | 149,100.0 | 2.73 |

**Source: Bank of Thailand (1973-2000); The UN (1973-2003).**

Table 2.3 demonstrates the fluctuating GDP growth of Thailand's agricultural sector during 1996-1999. Thailand's economic structure has slowly changed from agriculture to industry during the 1980s-1990s (Kim and Virasopontaviporn, 1989). The GDP share of Thailand's agricultural sector remained around 11-12 per cent during 1996-1999 (see Table 2.3). In contrast the GDP share of non-agricultural sectors such as manufacturing, wholesale and retail trade and other services was around 88 percent over the same period. The average annual sectoral growth rate of agriculture declined slightly by −1.5 per cent of GDP in 1999 in the immediate aftermath of the financial crisis, while manufacturing and service sector GDP growth increased by 1.7 per cent and 1.1 per cent, respectively.

Table 2.3 also displays the composition of the contribution of livestock sector consisting of dairy products to agricultural component of GDP during 1996-1999. The livestock sector has not performed well either compared to crop or fisheries sectors which grew steadily over the same period. Dairy products are a component of livestock GDP. The share of total livestock sector was 1 per cent of overall GDP in 1996. Its share was still 1.1 per cent of GDP in 1999. Thailand's domestic dairy industry is still a minor sector with a low production directed at domestic consumption. The trends of the dairy sector, however, indicate possible but slow expansion in the future. Hence, Australia's dairy product exporters will have opportunities in the future to increase their dairy product exports in the Thai market.

**Table 2.3: Thailand' GDP by Industrial Origin (at current prices: 1996-1999)**

|  | 1996 | | 1997 | | 1998 | | 1999 | |
|---|---|---|---|---|---|---|---|---|
|  | Billion Baht | % GDP | Billion Baht | % GDP | Billion Baht | % GDP | Billion Baht | % GDP |
| **Agriculture:** | 514.0 | 11.1 | 529.7 | 11.2 | 586.4 | 12.7 | 517.0 | 11.2 |
| Crops | 293.2 | 6.3 | 303.1 | 6.4 | 330.0 | 7.1 | 267.6 | 5.8 |
| **Livestock** | **43.9** | **1.0** | **43.9** | **0.9** | **43.8** | **0.9** | **49.1** | **1.1** |
| Fisheries | 87.8 | 1.9 | 94.9 | 2.0 | 126.1 | 2.7 | 109.3 | 2.4 |
| Forestry | 8.2 | 0.2 | 6.7 | 0.1 | 5.6 | 0.1 | 5.2 | 0.1 |
| Agricultural Services | 14.1 | 0.3 | 14.4 | 0.3 | 15.2 | 0.3 | 15.0 | 0.3 |
| Simple Agricultural Processing Products | 66.8 | 1.4 | 66.6 | 1.4 | 65.7 | 1.4 | 69.9 | 1.5 |
| **Non-Agriculture**: | 4,108.8 | 88.9 | 4,210.5 | 88.8 | 4,042.1 | 87.3 | 4,098.4 | 88.8 |
| Mining and Quarrying | 63.4 | 1.4 | 82.3 | 1.7 | 84.2 | 1.8 | 85.9 | 1.9 |
| Manufacturing | 1,303.4 | 28.2 | 1,362.7 | 28.7 | 1,363.0 | 29.4 | 1,435.4 | 31.1 |
| Construction | 341.7 | 7.4 | 269.3 | 5.7 | 175.1 | 3.8 | 162.1 | 3.5 |
| Electricity and Water Supply | 111.3 | 2.4 | 116.8 | 2.5 | 128.4 | 2.8 | 129.9 | 2.8 |
| Transportation and Communication | 340.6 | 7.4 | 369.2 | 7.8 | 360.3 | 7.8 | 376.0 | 8.1 |
| Wholesale and Retail Trade | 714.8 | 15.5 | 756.7 | 16.0 | 729.3 | 15.8 | 735.8 | 15.9 |
| Banking, Insurance and Real Estate | 346.3 | 7.5 | 322.7 | 6.8 | 243.1 | 5.3 | 151.6 | 3.3 |
| Ownership of Dwellings | 109.3 | 2.4 | 115.1 | 2.4 | 120.1 | 2.6 | 127.8 | 2.8 |
| Public Administration and Defence | 174.4 | 3.8 | 183.5 | 3.9 | 196.9 | 4.3 | 203.2 | 4.4 |
| Services | 603.7 | 13.1 | 632.3 | 13.3 | 641.7 | 13.9 | 690.8 | 15.0 |
| **GDP** | 4,622.8 | 100.0 | 4,740.2 | 100.0 | 4,628.4 | 100.0 | 4,615.4 | 100.0 |

**Source: Bank of Thailand (1985-2002).**

## 2.3 Historical Aspects of the Dairy Industry in Thailand

Dairy Industry in Thailand started about 100 years ago. In 1907, a group of Indian migrants began to produce fresh milk from crossbred cows and consumed it among their community in Bangkok. During the World War II, the Thai government established many dairy plants to produce milk and its derivatives, mainly ready-to-drink (RTD) milk products. In the 1950s, there were several small factories to produce pasteurized milk and ice cream but the domestic consumption was at a low level. There were only some groups of consumers such as well educated or foreigner groups. The Thai people did not have a habit of milk drinking and the Thai dairy industry had a limited processing capacity. Evidently, Thai dairy industry was not in a position to capture other groups of consumers.

During the 1970s, the Thai and Danish governments cooperated to set up the Thai-Danish dairy farm in Muak Lek, Saraburi. Both governments provided training facilities and other services to a dairy colony nearby, and supplied raw milk for a small-pasteurized milk plant. However, a number of dairy products were still imported to Thailand because several dairy exporter countries had comparative advantages in terms of lower-cost and higher quality than Thailand's dairy products. Therefore, Thailand imported large volumes various dairy products from many major supplier countries, for instance the European Union (the EU), New Zealand, and Australia. The imported dairy products consisted of sweetened milk, creams, milk powders, butter oil, cheese and other dairy products.

During the 1980s, Dairy Farming Promotion Organization (DPO), established by the Thai government and Nong Pho Dairy Cooperative, began ultra heated treat (UHT) plants and developed all previously operating pasteurized facilities. The DPO played a major role in developing the domestic dairy industry in the process of implementing government policies on milk products. The objectives of the DPO are as follows:

- To promote the raising of dairy cattle and other dairy animals;
- To produce milk, meat and other dairy products;
- To train and educate people in dairy husbandry;
- To buy, sell, exchange or give away dairy animals and dairy products;
- To operate other activities connected with dairying and its organizations; and

- To take up the processing and marketing of milk products (Jungkasemsuk, 1995).

Moreover, in 1985 the national milk promotion campaign by the Thai government began with the 'free school' milk program to encourage children and teenage groups changing their behaviour to drink more milk. This program ran with slogans such as "Have You had Your Milk Today" and " Milk for All". This project was also expected to reach 4.5 million children. As the result, there has been an increase in annual national per capita consumption of milk from 2 liters in 1986 to 18 liters in 1999. The value of total milk consumption has increased from 1,500 million baht to 25,000 million baht during 1986-1999 (Suwanabol, 1998).

In the mid 1990s, Thai dairy industry expanded and grew rapidly in both dairy production and dairy exports to nearby countries. Thailand's dairy products have been exported to Laos, Vietnam, Cambodia, Taiwan, Hong Kong and Myanmar. In particular, the Thai government has emphasised the support to local milk production for boosting supply and increasing in domestic consumption. The value of production of milk in 1997 was estimated at 11,300 million baht (AUSTRADE, 1997).

There are three categories of ownership to share the Thai dairy industry. Firstly, the government and the public co-operations have many UHT plants in Muk Lek, Khan Kean and some small pasteurized milk and cheese plants, such as in Changmai. Nong Pho dairy cooperatives also own pasteurized and UHT plants which have a capacity to produce over 200 tonnes per day. Secondly, the Department of Livestock Development (DLD), colleges of agriculture and technology, and the universities operate approximately 20 small pasteurized plants around the country. The Royal Family has also conducted a pilot dairy project inside the Chitlada palace. Finally, the private sector dairies consist of various major dairy plants with foreign ownership connections, such as Nestlé, Foremost Friseland, C.P Maiji, and the Thai Dairy Industry (TDI) with 30 per cent ownership by Australian Dairy Corporation (ADC). The average annual production capacity of the private sector in ready-to-drink (RTD) dairies has been estimated at 600,000 tonnes a year (Suwanabol, 1998). The dairy products that are produced and distributed in Thailand were pasteurized milk, cheese, milk powders, and milk tablets.

The Thai Dairy Industry and the DPO set up in 1998 new UHT plants with a capacity of almost 3,000 tonnes per day in an attempt to resolve the shortage of dairy products in the Thai market. Because of insufficient domestic raw milk production to meet the domestic demand, many dairy products were imported. The imported products were whole milk cream, milk powders for processing RTD milk products, specially flavoured milk and drinking yoghurt, preserved, concentrated and sweetened milk, cheese, butter, and whey products. The supply of dairy products in the Thai market was still inadequate in terms of the quantity and quality of domestic milk production, with high cost of production. In the recent years, Thailand had to import milk powders, butter oil, and cheese, amounting to a value of more than 12,000 million baht, from countries such as New Zealand, the European countries, Australia, and the United States.

## 2.4 Milk Production Sector and Policies

At present, there are almost 13,000 dairy farmers in Thailand. The average yield of raw milk per cow is low due to lack of new and improved technology, low feed availability, and the small, uneconomic size of most farm operations. The average dairy yield per cow is only about 5-7 kilograms. Table 2.4 and Figure 2.3 illustrate the population of dairy cows and production of fresh milk in Thailand during 1080-2000.

During 1982-2000, the number of dairy cows has increased significantly from 30,046 heads in 1982 to 352,010 heads in 2000 (see Table 2.4 and Figure 2.3). Fresh milk production also expanded from 27,028 tonnes to 494,692 tonnes over the same period. However, during 1994-1997 the growth of dairy cow numbers and milk production was slow, compared to the period 1998-2000 in which the rise was rapid. The slow growth during 1994-1997 has been attributed to limited land, insufficient labour and low capital investment in the dairy sector.

**Table 2.4: Population of Dairy Cows and Production of Fresh Milk in Thailand (1980-2000)**

| Year | Dairy Cow (Head) | Fresh Milk (tonnes) |
|------|------------------|---------------------|
| 1980 | na | 17,506 |
| 1981 | na | 21,311 |
| 1982 | 30,046 | 27,028 |
| 1983 | 37,819 | 36,029 |
| 1984 | 47,454 | 46,197 |
| 1985 | 53,343 | 57,895 |
| 1986 | 65,427 | 69,175 |
| 1987 | 77,676 | 89,912 |
| 1988 | 86,905 | 99,450 |
| 1989 | 96,646 | 118,945 |
| 1990 | 101,286 | 155,574 |
| 1991 | 105,766 | 193,895 |
| 1992 | 106,014 | 227,784 |
| 1993 | 126,262 | 293,255 |
| 1994 | 144,299 | 326,381 |
| 1995 | 159,098 | 350,196 |
| 1996 | 160,000 | 375,302 |
| 1997 | 171,526 | 385,477 |
| 1998 | 323,254 | 437,116 |
| 1999 | 339,265 | 464,514 |
| 2000 | 352,010 | 494,692 |

**na: not available.**
**Source: Centre of Agricultural Statistics, Agricultural Statistics of Thailand**
        **(1984-2000), The Office of Agricultural Economics.**

**Figure 2.3: Population of Dairy Cows and Production of Fresh Milk in Thailand (1980-2000)**
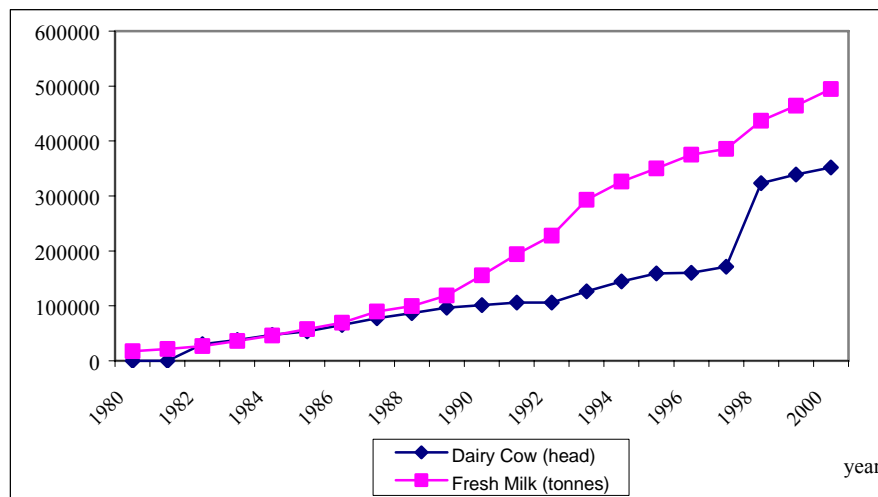


**Source: Centre of Agricultural Statistics, Agricultural Statistics of Thailand**
        **(1984-2000), The Office of Agricultural Economics.**

The problems of the dairy industry in Thailand include low productivity and high production costs. The national average of milk yield per cow per day has been 10-12 liters for many years which reflect no improvement although many farms have better quality cows producing 10-25 liters per day. In the past decade, Thailand imported 40,000 crossbred heifers from Australia and New Zealand, due to an insufficient number of high quality dairy cattle in Thailand. DLD has lunched he dairy-herd improvement (DHI) program and attempted to develop Thai fresh milk to increase supply on the domestic market.

The production of pasteurized and UHT milk in 1993 was about 580,000 tonnes. This included about 30,000 tonnes of capacity for the production of sterilized milk and approximately 100, 000 tonnes capacity for the production of frozen yoghurt and drinking yoghurt for domestic consumption. The capacity of pasteurized milk is greater than UHT, while the actual consumption and production of UHT milk are significantly greater than pasteurized milk.

During 1984-2000, raw milk production increased from 46, 000 tonnes to 785,880 tonnes. In 1996, the production of dairy products started well at about 1,000 tonnes per day or around 387,600 tonnes annually. However, this was still only 60 per cent of demand of RTD milk in the Thai market. In 2000, the demand of raw milk for RTD milk production reached 1, 213, 433 tonnes, while the supply of raw milk is in low capacity on just 785,880 tonnes, as shown in Table 2.5.

**Table 2.5: Raw Milk Production and RTD Milk Production  (1984-2000)**

(Tonnes)

| Year | Raw Milk Production | RTD Production |
|------|--------------------:|---------------:|
| 1984 | 46,000 | 62,400 |
| 1985 | 54,600 | 66,000 |
| 1986 | 69,200 | 81,600 |
| 1987 | 89,713 | 126,300 |
| 1988 | 106,709 | na |
| 1989 | 122,500 | na |
| 1990 | 155,600 | na |
| 1991 | 193,900 | na |
| 1992 | 227,800 | na |
| 1993 | 293,300 | na |
| 1994 | 326,400 | na |
| 1995 | 350,200 | na |
| 1996 | 387,600 | 710,818 |
| 1997 | 429,120 | 829,111 |
| 1998 | 563,400 | 961,829 |
| 1999* | 669,960 | 1,108,887 |
| 2000* | 785,880 | 1,213,423 |

**na: not available. *Estimated by Suwannabol.**
**Source: Suwanabol (1998).**

**Figure 2.4: Raw Milk Production and RTD Milk Production (1984-2000)**
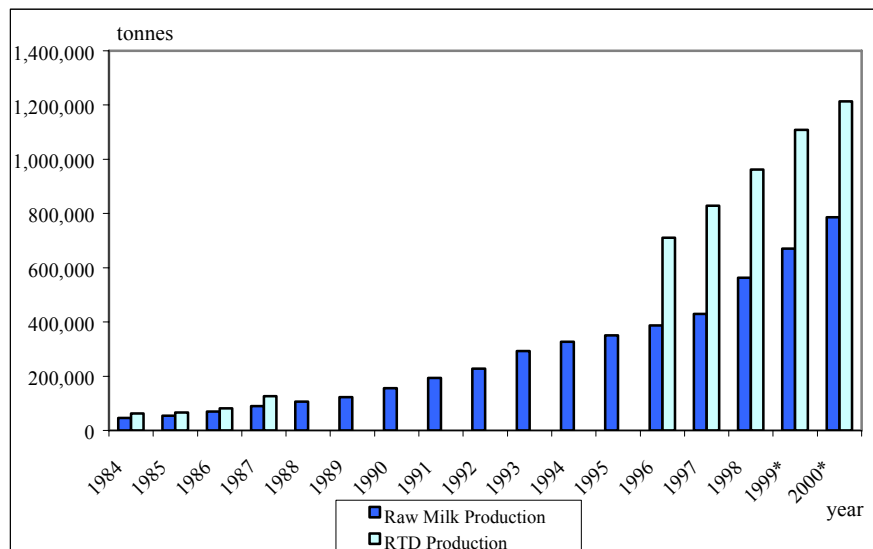


**Source: Suwanabol (1998).**

To support the domestic dairy industry further, the Thai Government set up the Dairy Production Policies Committee in 1988. There are many representatives consisting of the public sector, farmers, processors, importers who are involved in production, collection, processing, marketing and imports of dairy products. Their objectives are to provide government agencies with the vision, policy framework, production targets, and plan and the development of dairy products.

During 1994-1996, the strategies of the DPO have also incorporated special aims for dairy production, such as the following:

- To advocate as well as improve domestic dairy production aimed at self-sufficiency within the domestic dairy market;

- To increase farmers' income from the sale of fresh milk in order to upgrade their quality of life;

- To improve the nutrition of the population by producing quality products, sell dairy products at reasonable prices, and promote the domestic consumption focused on all the dairy products;

- To support the research and development of dairy cattle breeding and feeding in order to increase milk yield per cow and minimise fresh milk production cost; and

- To improve the efficiency of the operations to achieve the viability and to maintain the price stability of domestic fresh milk.

The Thai government's dairy production policies have aimed at self-sufficiency of domestic fresh milk production and the reduction of milk imports. The commercial dairy farming promotion areas have also been planned, and dairy farmers were required to register with collecting centres so as to facilitate the aspects of quality control and services. It specifies that promotion areas have to be located within a radius of 200 km from the collecting centre, which is responsible for collecting fresh milk from farmers in 50 km around the centre (The Office of Agricultural Economics, 1988a).

The policies enlist further objectives as follows:

- To improve production of raw milk encouraging cooperative system and private business to adopt good management;
- To improve structure of milk cattle farms to meet the standard system in 2001;
- To carefully consider on import non-dairy milk in order not to affect the domestic farmers known as "environmentally friendly"; and
- To regard milk product as the "green products".

Manufacturers or producers have to hold the responsibility for any destroyed packages, to encourage the research and development on raw milk processing or other value added products, to assign Food and Drugs Administration to cooperate with the Department of Livestock Development (DLD), to monitor the quality of milk product, and to establish a central organization that manages legal claims against any manufacturer or producer whose product is unqualified. (The BOI, 2003a).

The Co-operatives Promotion Department (CPD) is committed to stimulation of the growth of registered dairy co-operative members and to provide staff to advise the operation of co-operatives to assist dairy production, feeding, artificial insemination, vaccinations and decease control, milk collection and transport, and processing. Farmers who register with the co-operatives would receive free artificial insemination and vaccinations for the cows from DLD, and if any veterinary treatment is required, farmers will only pay for the prescriptions. These services will support adequate training and supervision to the members.

The marketing policy to support domestic milk production has been prepared to assist the dairy industry in increasing milk output. Dairy farmers also receive training in marketing under the co-operatives' framework that the local farmers have been advocated by the government's financial strategies for investment in the dairy sector. Consequently, investment takes place with low interest loans that are supported by the CPD, and technical supervision from DLD. At the same time, private processing plants are to assist either in the part of quality control, collection, and production, technology or in the initial investment of the centres which will be paid back by fresh milk produced in the farms. In order to increase domestic consumption of dairy products, the CPD has used marketing plans and consumer protection for the promotion of milk consumption in both public and private sectors (The BOI, 2003a).

The eighth National Economic and Social Development Board (NESDB) during 1997-2001 agreed to improve the domestic agricultural sector, including the dairy sector. The Board aims to create a link among the three main areas of agriculture, industry and services in order to promote locally produced raw materials and to increase employment and value added, to upgrade efficiency in production management to solicit cooperation from all parties in agricultural sector as well as be ready for economic changes, to use advanced agricultural technology for small farmers holding small land plots (The BOI 2003b).

The Thai government and the DPO advocate improving the dairy production under the production policy to increase domestic output for consumption and manufacturing. DPO focuses on research and development in order to increase milk yield per cow, to minimise fresh milk production cost, to set up a central organization that would help farmers and producers to manage the product quality and to cooperate in the government's financial strategies for investment. Consequently, Thailand's dairy industry has grown since 1990.

## 2.5 Consumption of Milk Products

The consumption of milk products in Thailand is still low by world standards due to cultural and dietary factors. The annual consumption of milk product accounts for 2 litres per person in Thailand. In the neighbouring countries, for example in Malaysia

milk product consumption is 43 per cent higher, while in Singapore it is 70 per cent higher than in Thailand. Thai milk consumption is significantly lower than Western consumption levels of 300-400 litres per person on average. In Thailand, there is a low level of consumption in rural areas. In contrast, there are more widespread consumption patterns in the capital city, Bangkok, where 50-60 per cent of all the dairy products are consumed by 15 percent of the population during 1990-1993 (Dairy Market Briefing, 1993).

In 1995, the total consumption of milk products in Thailand was estimated around 955,000 tonnes (AFG, 1995; See also Table 2.6). The assumed demand for milk for RTD ranked first for the drinking milk category, at approximately 396,000 tonnes. The growth rate of consumption in the Thai dairy market during 1996-2000 was estimated at 19 per cent (AFG, 1995). The demand for milk for RTD was to increase at 20 per cent. The fastest growth segments were drinking yoghurt by 50 per cent, ice cream by 25 per cent, and pasteurised milk by 20 per cent. The slowest growth rates in the Thai dairy market in 1995 was in butter by 10 per cent, sterilized milk by 10 per cent and sweetened condensed milk by 6 per cent.

The total consumption on raw milk equivalents has been at 1,670,000 tonnes in 1999. (See, Table 2.6). During 1992-1999, average annual growth rate of the overall dairy market was 13.15 per cent. Thailand's per capita consumption is still low at 26.5 litres per person per year in 1999. The assumed demand for liquid milk is for raw milk to produce fresh dairy products, RTD milk, yoghurt, cream, cheese, and butter. In 1999, the overall market was 910,000 tonnes. The RTD market has also been growing steadily at 13.32 per cent in 1999. As can be seen from Table 2.6, the demand for liquid milk has been used for producing RTD milk but this was still an insufficient for domestic dairy industry. The shortfall of raw material was a high volume at 620,000 tonnes in 1996. However, as increasing RTD production at 150,000 tonnes in 1999 indicated a still high demand in the domestic market. Hence, the high demand for raw material is satisfied with imported SMP and butter oil, and then included in the local products.

**Table 2. 6: Milk Production and Consumption (1992-1999)**

| Year | Raw Milk Produced (000' tonnes) | Total Consumption all Products in Raw Milk Equivalent (000' tonnes) | Assumed raw Milk Demanded by Processors for all Fresh Dairy Products 000' tonnes) | Assumed Raw Milk Demanded by Processors for RTD 000' tonnes) | Raw milk Shortfall (000' tonnes) | | | Population (Mil. Persons) | Total Milk Consumption Per Capita (litres) |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Total Consumption | Liquid Milk Demand | RTD | | |
| (1) | (2) | (3) | (4) | (5) | (3-2) | (4-2) | (5-2) | | |
| 1992 | 228 | 720 | 308 | 246 | 498 | 80 | 18 | 57.8 | 12.5 |
| 1993 | 293 | 755 | 386 | 301 | 462 | 93 | 8 | 58.3 | 12.9 |
| 1994 | 326 | 830 | 453 | 349 | 504 | 127 | 23 | 59.1 | 14.0 |
| 1995 | 350 | 955 | 521 | 396 | 605 | 171 | 46 | 59.9 | 16.0 |
| 1996 | 387 | 1,098 | 599 | 449 | 711 | 212 | 62 | 60.7 | 18.1 |
| 1997 | 429 | 1,263 | 689 | 510 | 834 | 260 | 81 | 61.5 | 20.5 |
| 1998 | 563 | 1,452 | 792 | 578 | 889 | 229 | 15 | 62.3 | 23.3 |
| 1999 | 670 | 1,670 | 910 | 655 | 1,000 | 240 | -15 | 63.1 | 26.5 |

notes: 1994-1999 estimated by AFG (1995), using 15 per cent growth for consumption and 1.3 per cent growth in population.
Source: AFG (1995); Suwanabol (1998).

Furthermore, there has been a significant growth of consumption in Thailand in RTD milk, UHT milk, pasteurised milk, drinking yoghurt, and ice cream, and to a lesser extent of cup yoghurt. Other dairy products, such as butter, cheese, and whey products have expanded in relatively small domestic markets, but there is still room for positive growth.

The Thai government has encouraged the people to increase their consumption of milk through various advertising campaigns to promote consumption of domestic milk products, including the public education about the nutritional value of milk. The Office of Agricultural Economics (OAE), Ministry of Education, the DPO, and the Milk Consumption Promotion conduct these campaigns. Management of Act School Milk objectives to establish School Milk Committee as well as to review milk purchasing and distribution by choosing to produce local milk for students (BOI, 2003b). Subsequently, the government emphasized more the nutritional benefits of milk for children and teenage program to support the implementation of dairy policy that replaces the school milk program. The Thai government expects to increase milk consumption per child from 10-12 litres a year to over 20-25 litre by the year 2007. The government budget has allocated an annual increment rate each year from 995 million baht in 1992 to 6,500 million baht in 2000 for the School Milk Program as shown in Table 2.7 (APFI, 1999).

As shown in Table 2.8, during 1998-2000, market share of the UHT sector in Thailand was 75 per cent, while the share of pasteurised milk has grown at 19 per cent and sterilized market share at 6 per cent. On other hand, the share of yoghurt was at a low level at 5 per cent, because the consumers in this group are only a small number of urban teenagers and children in Bangkok and some larger economic provinces of Thailand. Cheese and butter in the Thai market also have only a small market share at 0.5 per cent (Schroders, 1998; APFI, 1999).

**Table 2.7: Budget Allocation for the Thailand's School Milk Program (1992-2000)**

| Year | Budget (million baht) | No. of Target Children (million) |
|------|------|------|
| 1992 | 995 | 0.2 |
| 1993 | 1,267 | 0.4 |
| 1994 | 1,623 | 1.2 |
| 1995 | 2,802 | 1.7 |
| 1996 | 3,518 | 2.2 |
| 1997 | 4,671 | 4.3 |
| 1998 | 5,300 | 5.8 |
| 1999 | 6,000 | 6.2 |
| 2000 | 6,500 | 7.0 |

**Source: APFI (1999).**

**Table 2.8: Market Shares of Dairy Products in Thailand (1998-2000)**

| Dairy Product | Share (%) 1998-2000 | Value (million baht) |
|------|------|------|
| UHT | 75 | 7,000 |
| Pasteurized Milk | 19 | 1,200 |
| Sterilized Milk | 6 | 500 |
| Yoghurt | 5 | 500 |
| Cheese | 0.5 | na |
| Butter | 0.5 | na |

**na: not available.**
**Source: Schroders (1998), APFI (2000)**

## 2.6 Thailand's Imports and Exports of Dairy Products

As seen in Table 2.9, cereal and preparations, and meat exports are two of the main foreign exchange earners for Thailand. These have contributed to the Thai economic structure, as consisting of a change towards import-substitution in the 1970s, followed by export-orientation in the 1980s. Cereals and meat have become vital export sectors in Thailand. Exports of these sectors have substantially grown up to 88.64 per cent

from 1990 to 1998. Cereals and prepared food share had the highest share of Thailand's grain and meat exports since 1980. However, the share has gradually declined from 96.48 per cent in 1980 to 85.74 per cent in 1995. Meat and prepared meat products are the second largest exports, at 22.63 per cent in 1991. Dairy products and eggs exports of Thailand are a small proportion, similar to livestock. Dairy products and eggs exports have had an average annual growth rate of only 1.19 per cent from 1980 to 1998.

Tables 2.9 and 2.10 show that the value of Thailand's imports of cereals and cereal preparations, and meat and meat preparations are lower compared to the value of exports of such products. Thailand has been a significant food product supplier in the world market, such as rice, topical products and sugar (Bank of Thailand, 1973-2000). However, dairy products and eggs formed a high proportion of imports due to inadequate domestic production (as mentioned in section 2.5). During 1980-1998, Thailand's dairy products and eggs have an annual average imports share of 44.69 per cent and had the highest import share. Thailand's dairy products and eggs imports have stabilised at a high value since 1980, although there were fluctuations between 1989-1996. Cereal and prepared food are the imports of second most importance with an average annual import share of 44.95 per cent, while meat and prepared meat products as well as livestock have a lower import share.

**Table 2.9: Thailand's Grain and Meat Exports (1980-1998)**

| Year | Cereals and Preparations | | Dairy Products and Eggs | | Meat and Meat Preparations | | Live Animals | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Value ($US10,000) | % Exports | Value ($US10,000) | % Exports | Value ($US10,000) | % Exports | Value ($US10,000) | % Exports | Value ($US10,000) | % Exports |
| 1980 | 136,466 | 96.48 | 867 | 0.61 | 3,287 | 2.32 | 818 | 0.57 | 141,438 | 100 |
| 1985 | 118,967 | 93.62 | 1,033 | 0.81 | 6,321 | 4.97 | 740 | 0.58 | 127,061 | 100 |
| 1986 | 118,985 | 88.39 | 1,530 | 1.13 | 13,612 | 10.11 | 488 | 0.36 | 134,615 | 100 |
| 1987 | 109,292 | 84.00 | 2,447 | 1.88 | 18,091 | 13.90 | 282 | 0.21 | 130,112 | 100 |
| 1988 | 158,501 | 87.67 | 1,509 | 0.83 | 20,465 | 11.32 | 316 | 0.17 | 180,791 | 100 |
| 1989 | 200,107 | 88.28 | 1,540 | 0.68 | 24,777 | 10.93 | 227 | 0.10 | 226,651 | 100 |
| 1990 | 133,246 | 79.54 | 2,531 | 1.51 | 31,424 | 18.76 | 305 | 0.18 | 167,506 | 100 |
| 1991 | 145,989 | 75.87 | 2,572 | 1.33 | 43,595 | 22.63 | 261 | 0.13 | 192,417 | 100 |
| 1992 | 156,966 | 76.07 | 2,324 | 1.12 | 46,658 | 22.16 | 384 | 0.18 | 206,332 | 100 |
| 1993 | 147,888 | 76.10 | 2,717 | 1.40 | 43,047 | 22.15 | 694 | 0.35 | 194,346 | 100 |
| 1994 | 176,486 | 76.40 | 3,860 | 1.17 | 49,902 | 21.60 | 777 | 0.33 | 231,025 | 100 |
| 1995 | 215,081 | 78.20 | 3,952 | 1.43 | 55,049 | 20.01 | 943 | 0.34 | 275,025 | 100 |
| 1996 | 222,355 | 79.49 | 4,413 | 1.57 | 51,785 | 18.51 | 1,171 | 0.42 | 279,724 | 100 |
| 1997 | 131,629 | 78.73 | 2,625 | 1.57 | 32,109 | 19.20 | 825 | 0.49 | 167,188 | 100 |
| 1998 | 267,368 | 85.74 | 2,625 | 0.84 | 40,857 | 13.10 | 954 | 0.30 | 311,804 | 100 |

**Source: FAO Trade Yearbook (1980-2001).**

**Table 2.10: Thailand's Grain and Meat Imports (1980-1998)**

| Year | Cereals and Preparations | | Dairy Products and Eggs | | Meat and Meat Preparations | | Live Animals | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Value ($US10,000) | % Imports | Value ($US10,000) | % Imports | Value ($US10,000) | % Imports | Value ($US10,000) | % Imports | Value ($US10,000) | % Imports |
| 1980 | 5,679 | 44.64 | 6,425 | 50.50 | 62 | 0.48 | 556 | 4.37 | 12,722 | 100 |
| 1985 | 5,741 | 39.47 | 8,113 | 55.78 | 121 | 0.83 | 569 | 3.91 | 14,544 | 100 |
| 1986 | 5,066 | 35.46 | 8,003 | 56.02 | 126 | 0.88 | 1,091 | 7.63 | 14,286 | 100 |
| 1987 | 6,010 | 32.62 | 9,632 | 52.27 | 169 | 0.91 | 2,614 | 14.18 | 18,425 | 100 |
| 1988 | 9,054 | 35.26 | 12,974 | 50.53 | 192 | 0.74 | 3,454 | 13.53 | 25,674 | 100 |
| 1989 | 12,035 | 43.40 | 12,833 | 46.27 | 291 | 1.05 | 2,574 | 9.28 | 27,733 | 100 |
| 1990 | 13,371 | 40.60 | 16,389 | 49.76 | 403 | 1.22 | 2,769 | 8.41 | 32,932 | 100 |
| 1991 | 16,449 | 44.25 | 15,913 | 42.81 | 441 | 1.18 | 4,366 | 11.74 | 37,169 | 100 |
| 1992 | 26,427 | 50.74 | 21,970 | 42.18 | 611 | 1.73 | 3,070 | 5.90 | 52,078 | 100 |
| 1993 | 23,490 | 50.11 | 20,437 | 43.60 | 705 | 1.50 | 2,243 | 4.78 | 46,875 | 100 |
| 1994 | 27,126 | 49.80 | 24,741 | 45.42 | 505 | 0.92 | 2,090 | 3.38 | 54,462 | 100 |
| 1995 | 34,853 | 49.13 | 33,267 | 46.90 | 600 | 0.84 | 2,208 | 3.11 | 70,928 | 100 |
| 1996 | 42,435 | 51.57 | 37,104 | 45.10 | 522 | 0.63 | 2,224 | 2.70 | 82,285 | 100 |
| 1997 | 20,766 | 46.11 | 22,929 | 50.92 | 369 | 0.81 | 966 | 2.14 | 45,030 | 100 |
| 1998 | 32,520 | 57.27 | 22,929 | 40.38 | 369 | 0.65 | 966 | 1.70 | 56,784 | 100 |

**Source: FAO Trade Yearbook (1980-2001).**

Tables 2.11 and 2.12 show that Thailand's dairy product exports are classified into five categories: milk condensed and evaporated, milk dry[1], butter, cheese, and whey[2] products. Milk condensed and evaporated has been at first rank of exports since 1988. Their share of total dairy exports has declined in a short time from 59.50 per cent in 1998 to 17.33 per cent in 1990. Since 1991, however, there has been a substantial growth to 95.42 per cent in 2001. Milk dry is the second highest volume of exports even though its proportion has not been increasing consistently. The percentage share of milk dry exports was at a peak in 1991 at 40.40 per cent, but in the years that followed, its exports share decreased gradually to 2.82 per cent in 2001. The low ratios of Thailand's dairy product exports are for butter, cheese, and whey products. Thailand does not have comparative advantage in these three categories, resulting from inferior production technology and lack of raw materials (The Department of Customs, 1990). Both butter and cheese have a very small ratio of exports with average annual export share at 0.075 per cent and 0.23 per cent, respectively during 1988-2001. The share of whey products has declined significantly from 61.68 per cent in 1990 to as low as 1.56 per cent in 1995. However, Preechajarn (2003) argue that Thailand exports dairy products by repackaging and sale. The export destinations of Thailand's dairy products are mainly the nearby countries: Vietnam, Laos, Burma, Cambodia, the Philippines, Singapore, Indonesia, Taiwan, and the biggest market, China (The Department of Customs, 1998).

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1. Milk dry is a wholesome dairy product made from fresh milk. Cream and water are removed. It still contains the calcium and other minerals, the vitamins, natural sugar and high quality protein. Milk dry can also make SMP and WMP (Brennand, 1991).

2. Whey is a by product of the cheese making process. It is disposed of in liquid form. The value of whey components has been in the production of whey powders and protein concentrates. Whey powder is used in ice cream, bakery, chocolate, flavouring, yoghurt, and beverages. Whey protein is used in snack foods, juices, confectionary, ice cream, biscuits, processed meats, protein drinks, and dessert (ADC, 2003b).

**Table 2.11: Thailand's Dairy Product Exports (1988-2001)**

(Metric Tonnes)

| Year | Milk Condensed and Evaporated | Milk Dry | Butter | Cheese | Whey Products | Total |
|------|------|------|------|------|------|------|
| 1988 | 5,374 | 879 | 3 | 3 | 2,773 | 9,032 |
| 1989 | 4,112 | 764 | 1 | 2 | 3,141 | 8,020 |
| 1990 | 1,648 | 1,991 | 0.4 | 4 | 5,866 | 9509.4 |
| 1991 | 4,785 | 4,007 | 44 | 1 | 1,080 | 9,917 |
| 1992 | 8,145 | 2,386 | 1 | 1 | 338 | 10,871 |
| 1993 | 11,141 | 3,096 | 2 | 4 | 535 | 14,778 |
| 1994 | 14,591 | 7,034 | 14 | 10 | 332 | 21,981 |
| 1995 | 20,638 | 2,346 | 3 | 444 | 372 | 23,803 |
| 1996 | 19,132 | 2,633 | 4 | 5 | 446 | 22,220 |
| 1997 | 21,602 | 2,976 | 7 | 133 | 1,226 | 25,944 |
| 1998 | 25,536 | 3,288 | 2 | 39 | 466 | 29,331 |
| 1999 | 23,622 | 3,014 | 59 | 138 | 672 | 27,505 |
| 2000 | 30,307 | 2,552 | 64 | 29 | 1,974 | 34,926 |
| 2001 | 94,154 | 2,791 | 16 | 20 | 1,683 | 98,664 |

**Source: FAO Trade Yearbook (1988-2001); The Department of Customs (1988-2004).**


**Table 2.12: Percentages of Thailand's Dairy Product Exports (1988-2001)**

| Year | Milk Condensed and Evaporated | Milk Dry | Butter | Cheese | Whey Products | Total |
|------|------|------|------|------|------|------|
| 1988 | 59.50 | 9.73 | 0.03 | 0.03 | 30.70 | 100 |
| 1989 | 51.27 | 9.52 | 0.01 | 0.02 | 39.16 | 100 |
| 1990 | 17.33 | 20.93 | 0.01 | 0.04 | 61.68 | 100 |
| 1991 | 48.25 | 40.40 | 0.44 | 0.01 | 10.89 | 100 |
| 1992 | 74.92 | 21.94 | 0.01 | 0.01 | 3.11 | 100 |
| 1993 | 75.38 | 20.95 | 0.01 | 0.01 | 3.62 | 100 |
| 1994 | 66.38 | 32.00 | 0.06 | 0.04 | 1.51 | 100 |
| 1995 | 86.70 | 9.85 | 0.01 | 1.86 | 1.56 | 100 |
| 1996 | 86.10 | 11.84 | 0.02 | 0.02 | 2.01 | 100 |
| 1997 | 83.26 | 11.47 | 0.03 | 0.51 | 4.72 | 100 |
| 1998 | 87.06 | 11.20 | 0.01 | 0.13 | 1.59 | 100 |
| 1999 | 85.88 | 10.95 | 0.21 | 0.50 | 2.44 | 100 |
| 2000 | 86.77 | 7.30 | 0.18 | 0.08 | 5.65 | 100 |
| 2001 | 95.42 | 2.82 | 0.02 | 0.02 | 1.70 | 100 |

**Source: FAO Trade Yearbook (1988-2001); The Department of Customs (1988-2004).**

As shown in Tables 2.13 and 2.14, the bulk of Thailand's dairy product imports comprised of milk dry. This is caused by a heavy usage of milk dry as the main raw material in the Thai dairy processing industry. The percentage of milk dry imports has fluctuated from 85 per cent in 1998 to 78.53 per cent in 1994, and increased again to 84.23 per cent in 1995. Whey products have become the second most important dairy product import. Thailand's dairy processing industry has used whey products for manufacturing ice cream and bakery products (ADC, 2000). It can be seen from Table 2.14 that the import shares of whey products increased from 8.21 per cent in 1995 to 24.78 per cent in 2001. Since 1989, the share of butter imports has decreased gradually to 8.19 per cent in 2001. The imports of milk condensed and evaporated, and cheese, have been in low volumes each year, and in 2001, their percentage shares of dairy imports were only 1.49 per cent and 1.70 per cent, respectively.

At present, Thailand imports dairy products from a number of countries. The largest sources of imports are New Zealand, Australia, the USA, and Canada. Other major sources are Netherlands, Poland, Italy, Denmark, France, Spain, Finland, Norway, Sweden, the United Kingdom, Belgium, and Germany. Japan, Israel, the Philippines, Malaysia, Singapore, Taiwan, Iran, China, and Turkey are also the sources of Thailand's dairy imports. (The Department of Customs, 1988-2004).

**Table 2.13: Thailand's Dairy Product Imports (1988-2001)**

(Metric Tonnes)

| Year | Milk Condensed and Evaporated | Milk Dry | Butter | Cheese | Whey Products | Total |
|------|------|------|------|------|------|------|
| 1988 | 210 | 66,195 | 8,504 | 695 | 2,267 | 77,871 |
| 1989 | 18 | 46,698 | 8,886 | 878 | 5,182 | 61,662 |
| 1990 | 91 | 64,862 | 10,058 | 941 | 10,746 | 86,698 |
| 1991 | 91 | 69,191 | 11,903 | 1,185 | 11,715 | 94,085 |
| 1992 | 90 | 86,891 | 14,097 | 1,365 | 7,420 | 109,863 |
| 1993 | 108 | 77,031 | 12,378 | 1,135 | 8,530 | 99,182 |
| 1994 | 220 | 102,640 | 18,541 | 1,470 | 7,819 | 130,690 |
| 1995 | 106 | 121,111 | 9,135 | 1,607 | 11,813 | 143,772 |
| 1996 | 175 | 117,604 | 7,622 | 1,515 | 16,741 | 143,657 |
| 1997 | 2,351 | 140,171 | 12,750 | 1,750 | 25,589 | 182,611 |
| 1998 | 1,817 | 103,278 | 10,535 | 1,314 | 16,222 | 133,166 |
| 1999 | 1,287 | 105,827 | 11,043 | 1,382 | 22,832 | 142,371 |
| 2000 | 4,690 | 101,273 | 12,619 | 1,660 | 32,434 | 152,676 |
| 2001 | 2,230 | 95,187 | 12,221 | 2,543 | 36,971 | 149,152 |

**Source: FAO Trade Yearbook (1980-2001).**


**Table 2.14: Percentages of Thailand's Dairy Product Imports (1988-2001)**

| Year | Milk Condensed and Evaporated | Milk Dry | Butter | Cheese | Whey Products | Total |
|------|------|------|------|------|------|------|
| 1988 | 0.26 | 85.00 | 10.92 | .089 | 2.91 | 100 |
| 1989 | 0.03 | 75.73 | 14.41 | 1.42 | 8.40 | 100 |
| 1990 | 0.10 | 74.81 | 11.60 | 1.08 | 12.39 | 100 |
| 1991 | 0.09 | 73.54 | 12.65 | 1.25 | 12.45 | 100 |
| 1992 | 0.08 | 79.09 | 12.83 | 1.24 | 6.75 | 100 |
| 1993 | 0.10 | 77.66 | 12.48 | 1.14 | 8.60 | 100 |
| 1994 | 0.16 | 78.53 | 14.18 | 1.12 | 5.98 | 100 |
| 1995 | 0.07 | 84.23 | 6.35 | 1.12 | 8.21 | 100 |
| 1996 | 0.12 | 81.86 | 5.30 | 1.11 | 11.65 | 100 |
| 1997 | 1.28 | 76.75 | 6.98 | 0.96 | 14.01 | 100 |
| 1998 | 1.36 | 77.55 | 7.91 | 0.98 | 12.18 | 100 |
| 1999 | 0.90 | 74.33 | 7.75 | 0.97 | 16.03 | 100 |
| 2000 | 3.07 | 66.33 | 8.26 | 0.01 | 21.24 | 100 |
| 2001 | 1.49 | 63.81 | 8.19 | 1.70 | 24.78 | 100 |

**Source: FAO Trade Yearbook (1980-2001).**

## 2.7 Conclusion

After the financial turmoil and severe economic downturn, Thailand's economy has returned to a stable position with a growth rate of GDP from 4.59 per cent in 1999 to 4.72 per cent in 2000. Thailand's economic structure has also shifted significantly from agriculture to industry since the 1990s. Additionally, in recent years, both domestic agricultural and non-agricultural sectors have grown to a positive state and created a trade surplus in 1998.

The agricultural sector in particular has been a significant contributor to Thailand's economic growth, reflected in the GDP. This sector represented 11.55 per cent of GDP during 1996-1999 although it is in a smaller proportion compared to non-agriculture contributors such as manufacturing. The livestock output is also part of agricultural sector and the title "dairy products" has become a sub-section of the livestock output. Dairy products have been a minor part of the overall GDP, but there are trends towards positive expansion of the Thai dairy market in recent years.

Historically, since the 1950s the dairy industry in Thailand has been growing steadily. The Thai government also set up institutes such as DPO and many dairy plants to produce milk and its derivatives for the domestic market. In the 1970s, it cooperated with major dairy suppliers, for example Danish government and the ADC to develop the domestic dairy industry. In the mid 1990s, Thai dairy industry expanded and grew rapidly in both production and exports to nearby countries. Additionally, the Thai government began the "free school milk programme" to encourage children and teenage groups to shift their behaviour to drink more milk. However, the dairy sector of Thailand is still incapable of meeting the demand from the domestic dairy processing industry. Hence, Thailand has to import a large volume of dairy products each year.

In terms of export-import trade, Thailand's dairy products could be classified into five major categories: milk condensed and evaporated, milk dry, cheese, butter, and whey products. In the export side, Thailand's dairy imports and domestic products are repackaged and offered for sale. Prior to 1988, the bulk of exports were milk condensed

and evaporated. Their export share of total dairy exports has increased from 59.50 per cent in 1988 to 95.4 per cent in 2001. Milk dry is the second major dairy export with a stable increase of the share to 40.40 per cent of dairy exports in 1991. Other three categories, butter, cheese, and whey products still form a low share of dairy exports with an average annual exports share of 0.01 per cent, 0.05 per cent, and 3.67 per cent, respectively.

Thailand's dairy product imports are high in volume each year. Milk dry is the first rank, being used as raw material in dairy processing. Its share in total dairy imports has grown to 63.81 per cent of imports in 2001. Whey products have been utilised to produce ice cream, and bakery products. Hence, they are the second major dairy imports at 24.78 per cent in 2001. Butter, and cheese are in low ratio of imports because of small consumption in the Thai market. Milk condensed and evaporated are the lowest ranked imports due to sufficient domestic production and exports in large volumes to nearby countries.

In Chapter 3, Thailand's dairy product import policies are reviewed. The main import policies of Thailand with regard to dairy products are import quotas, import tariffs, and domestic content requirements. Chapter 3 also focuses on the evolution of Thailand's dairy import policies within the trade liberalisation framework of GATT and WTO. The review in Chapter 3 is important, because the nature of the Thai dairy import policies determine the ease or difficulty with which the exporting countries including Australia could export dairy products to Thailand.

# Chapter 3

# Thailand's Trade Policies in Relation to Dairy Product Imports

## 3.1 Introduction

The purpose of this chapter is to provide a review of Thailand's trade policies in relation to dairy products imported by Thailand. It begins with a description of the development of Thailand's trade policy since the early 1950s when an open economy and trade liberalisation led to economic growth. In 1984, Thailand came under the umbrella of General Agreement of Tariffs and Trade (GATT). It has been a member of the World trade Organisation (WTO) since the mid 1990s. The Thai government has cooperated by opening its market to foreign trade. Hence, Thailand has to follow GATT and WTO rules regardless of whether the effects are positive or negative on its trade in agricultural products including dairy products. The result has been a reduction in import tariffs and an increase in import quotas for such products.

This chapter proceeds as follows: Section 3.2 reviews the historical development of Thailand's trade policy. Section 3.3 describes Thailand and GATT in general and focuses on dairy industry and trade in Sub-section 3.3.1. In Section 3.4, Thailand's relationship with WTO is explained, and in Sub-Section 3.4.1 the focus is on Thailand's dairy industry and trade under WTO. Section 3.5 presents concluding remarks.

## 3.2 The Development of Thailand's Trade Policy

Thailand has passed through several stages of policy development. Until the 1960s Thailand has had an open trade and exchange system, which has led to economic growth. In the late 1950s, Thailand had import tariff rates ranging from 15 per cent to 30 per cent, which were low in comparison to other developing countries. During the 1960s, Thailand began to develop itself through an import substitution policy. The Thai government began implementing trade barriers and supporting the manufacturing sector via an import-substitution policy that also favoured private investment. Thailand's manufacturing sector consisting of many sub-sectors attempted to produce its own

domestic products to replace imported goods. The Thai government also supported and protected heavily its domestic industry from foreign competition. Additionally, the policy favoured large enterprises that led to capital-intensive industries with heavy import dependence for inputs.

Under the first and second National Economic and Social Development Plans (NESDP), during 1962-1971, protection was provided to Thai industries that used domestic raw materials and labour-intensive production methods. Under the third plan (1972-76), industrialisation and trade policy concentrated on a shift from import substitution to promotion of exports. The focus of forth, fifth, sixth, and seventh plans was on the policies to promote exports. Even though the Thai government had concentrated on export orientation since the third plan, import tariffs were still high with a range of approximately 30-60 per cent. These were more or less maintained until 1982, and then, tariffs were substantially increased on several goods, which included dairy products. Under the fourth plan (1977-81), large-scale exporting firms and trading companies were encouraged and an export-processing zone was established. The fifth plan (1982-86) focused on industrial adjustment and encouraged small-scale industries. The sixth plan (1987-91) stressed on restructuring tax incentives. The seventh plan (1992-96) concentrated on export orientation, the diversification of export markets and industrial location (NESDB, 1967-1996).

Similarly to many other developing countries, Thailand's tariff structure was a kind of tariff escalation in which the average level of the tariff increases with the degree of processing of the product (Robinson et al, 1991). Domestic raw materials were at low tariff rate, and finished products were at high rates. As a result, effective rates of protection (ERP) were higher than these implied by the nominal tariff rates. Thailand also implemented a tariff exemption on the importation of specific products, but utilized non-tariff barriers for some other imports.

In the 1960s, Thailand had one of the lowest tariff rates in Asia. Nominal rate of protection (NRP) for final and intermediate goods averaged at 25-35 per cent, and for

capital goods at 15-20 per cent (Suphchalasai, 1995). Nevertheless, in 1969, Thailand had a balance of payment deficit of over 113 million baht. The Thai government made a decision to raise import tariffs in an effect to solve these problems. As a result, the average nominal tariff rate for consumer imports grew to 30-35 per cent in 1971, while the intermediate and capital imports had still the same rates. High inflation because of the oil crisis caused the Thai government to lower import tariffs on raw materials, intermediate products and capital goods in order to reduce the cost of industrial production between 1973-1974. As a result, the effective rate of protection was higher than nominal rate of protection for finished consumer products as shown in Table 3.1.

**Table 3.1: Nominal and Effective Rates of Protection (1964-1978)**

|  | 1964 | 1969 | 1971 | 1974 | 1978 |
|---|---|---|---|---|---|
| **Nominal Rate of Protection (NRP)** |  |  |  |  |  |
| Processed Food | 17.76 | -18.7 | 50.91 | 29.9 | 0-30 |
| Beverages and Tobacco | 220.68 | 82.8 | 116.48 | 52.5 | 60-100 |
| Construction Materials | 26.00 | 24.1 | 21.83 | 3.75 | na |
| Intermediate Products | 5.17 | -3.7 | 11.37 | 4.95 | 5-100 |
| Consumer Non-durables | 32.86 | 30.5 | 44.92 | 41.63 | 30-100 |
| Consumer Durables | 27.00 | 29.8 | 44.95 | 59.12 | 60-80 |
| Machinery | 21.60 | 18.7 | 10.21 | 5.55 | 2-30 |
| Transport Equipment | 41.92 | 29.7 | 58.79 | 62.88 | 30-150 |
| **Effective Rate of Protection (ERP)** |  |  |  |  |  |
| Processed Food | 37.33 | -32.60 | 205.92 | -71.19 | -2-466 |
| Beverages and Tobacco | 65.47 | 241.3 | 439.21 | 409.83 | -25-40 |
| Construction Materials | 21.26 | 47.4 | 23.41 | -15.93 | na |
| Intermediate Products | 6.54 | 2.8 | 15.28 | 10.37 | -15-4 |
| Consumer Non-durables | 42.44 | 32.5 | 57.44 | 61.84 | 72-669 |
| Consumer Durables | 21.96 | 69.1 | 93.20 | 144.75 | 102.6 |
| Machinery | 17.74 | 30.6 | 7.58 | 12.89 | 5-83 |
| Transport Equipment | 121.69 | 34.9 | 146.45 | 181.10 | 55-392 |

**Source: Suphachalasai (p. 433, 1995).**

Thailand was in balance of trade and payment deficit again in 1975. Thus, the Thai government increased import tariffs, and the effective rates of protection for all the industries (except for food, beverage and tobacco) increased from 44.2 per cent in 1971 to 90.3 per cent in 1978 (see Table 3.1). From 1961 to 1981, Thailand's import tariffs significantly shifted to increase the Thai government revenue, reducing the balance of trade and payment deficits, and making inflation stable. Trade policies concentrated on protection of its domestic industries such as agriculture, textile, mining and vehicles. The rates of protection for the agricultural sector, however, were negative because they had to pay export taxes and import tariffs for inputs such as farm machinery and raw material. On the other hand, domestic manufactures were effectively protected during the 1960s-1980s, for example those producing textiles, cooking oil, bakery, wheat products, cosmetics, and dairy products.

In 1981, the Thai government devalued the hitherto overvalued baht by 8.7 per cent and in particular, reduced protection for domestic industrial sector acted to reduce anti export bias at the same time. In 1982, the rates of tariffs for processed food imports declined from 80 per cent to 60 per cent, and the tariff rate on several chemical products and machinery rose to 30 per cent. The Thai government reduced the protection for finished consumer products and increased the protection for intermediate and capital goods. The Thai government was to reduce tariffs again on intermediate products and raw material imports from 30 per cent to 15 per cent, and the tariff on minerals declined from 10 per cent to 5 per cent in 1983 (Suphachalasai, 1995).

The devaluation of the baht by 14.8 per cent in 1984 resulted in a reduction of average effective rate of protection from 28 per cent to 26 per cent. With the budget deficit, the Thai government had to raise import tariffs again in 1985. The 1980s the increase of tariff by 5 per cent on raw material and intermediate products, 10 per cent on finished products, and more than 10 per cent on textile products and automobile accessories. The effective rate of protection grew from 26 per cent in 1984 to 30 per cent in 1985 (Suphachalasai, 1995).

**Table 3.2: Nominal and Effective Rates of Protection (in 1981-1985)**

|  | 1981 | 1983 | 1984 | 1985 |
|---|---|---|---|---|
| **Nominal Rates: Overall Average** |  |  |  |  |
| **Unweighted average** | 31 | 33 | 30 | 34 |
| **Weighted average** | 14 | 16 | 15 | 18 |
| **Weighted Sector Average:** |  |  |  |  |
| Consumer Goods | 25 | 22 | 20 | 28 |
| Intermediate Products | 13 | 16 | 15 | 14 |
| Raw Materials | 2 | 3 | 3 | 5 |
| Capital Goods | 14 | 18 | 17 | 22 |
| **Effective Rates: Unweighted Averages** |  |  |  |  |
| Agriculture | 25 | 26 | 24 | 28 |
| Other Primary Products | 5 | 7 | 7 | 10 |
| Agro Processing Products | 115 | 139 | 130 | 135 |
| Manufacturing | 77 | 67 | 57 | 66 |
| **Effective Rates: Weighted Average*** |  |  |  |  |
| Agriculture | 11 | 11 | 11 | 13 |
| Other Primary Products | 6 | 8 | 8 | 10 |
| Agro Processing Products | 25 | 30 | 29 | 33 |
| Manufacturing | 54 | 50 | 49 | 52 |
| **Overall Average** | 28 | 28 | 26 | 30 |

**\*Weighted by import values.**
**Source: Suphachalasai (p. 435, 1995).**

Because of balance of trade and payment deficits, the Thai government was not able to reduce industrial protection during the latter part of the 1980s. In the early 1990s, the government increased protection for some industries. For example, the government banned motor vehicle imports with an engine size smaller than 2,500 cc in 1990, and as a result the sale of automobiles decreased from 60 per cent to 5 per cent. In 1991, the tariffs on computer and computer products were reduced from 10-40 per cent to 1-5 per cent, while for machines, equipment and chemicals for the preservation of energy and protection of the environment, tariffs were reduced from 10-40 per cent to 0-5 per cent (WTO, 1995a). In comparison with its East Asian neighbours, Thailand's average

nominal tariff was the highest. However, Thailand had a relatively low level of non-tariff barriers, including quantitative restrictions (Bhattacharya and Lin, 1988). As shown in Table 3.3, in Thailand, finished goods were subjected to relatively high nominal tariff rates, while raw materials were subjected to relatively low rates.

**Table 3.3: Thailand's Nominal Tariffs and Import Duties: (1981-1990)**

| Product | Weighted Nominal Tariffs | Average Import Duties | |
|---|---|---|---|
| Year | 1981 | 1985 | 1990 |
| Computer goods | 24.8 | 25.4 | 18.0 |
| Intermediate products | 14.1 | 12.1 | 8.5 |
| Raw materials | 5.1 | 12.1 | 8.5 |
| Capital goods | 22.3 | 12.7 | 9.9 |
| Automotive products | 63.0 | 44.8 | 42.5 |

**Source: Jungkasemsuk (p. 48, 1995).**

In 1992, the Thai government arranged to reduce the import tariff rates to five group rates. These were 0 per cent for raw materials in short supply within the domestic market, 5 per cent for raw materials, 10 per cent for intermediate products, 20 per cent for finished manufactured products and over 20 per cent for products where protection from imports was still needed. The Thai government reduced tariffs for more than 1,000 items within 24 major commodity groups (WTO, 1995b).

## 3.3 Thailand and GATT

The Uruguay Round negotiations of GATT obliged the member nations to reduce import tariffs since 1988. At the conclusion of the Uruguay Round of GATT at the end of 1994, new changes focused on manufacturing and processing goods, including dairy products. The direct connection of member countries' imports to local production constitutes non-tariff barriers (NTBs), which member countries had to dismantle, if they were to participate fairly in the world trade.

In 1982, Thailand became a member of GATT, and the Thai government was committed to reduce most import tariffs. In place of 30 per cent of industrial tariff lines remaining unbound in Thailand, at the conclusion of Uruguay Round the average import tariff would be around 29 per cent, including the effects of tariffication[1] for 23 tariff lines. In comparison to the beginning of negotiations, about 40 per cent to 60 per cent of tariff lines would be in the 25-30 per cent range. About 24 out of 95 total categories based on the 4-digit SITC level will evidently have a simple average tariffs lower than applied tariffs. Uruguay round commitments have also already influenced the applied rates. For textiles and clothing and agricultural products, the tariff reduction is over a 10-year period.

In 1988, final Uruguay round tariff peaks at the 4-digit ISIC level were for agricultural and livestock products at 218 per cent, dairy products at 216 per cent, textile spinning, weaving at 100 per cent, for dresses at 100 per cent, and motor vehicles at 100 per cent. The tariff peaks for agricultural items were subjected to tariffication. The average import tariffs were the highest for sugar products at 79.2 per cent, liquor at 60 per cent, and tobacco at 60 per cent (Robinson et al, 1991). In the agricultural sector, import tariffs would be eliminated by an average rate of 24 per cent from the initial tariff rates as a result of Uruguay Round negotiations. Tariffication applied to 23 product groups, including rice, silk, sugar and milk products, with the special safeguards reflected in current applied rates. The exceptions include vegetables, fruit, processed meat products and canned foods, where significant tariff reductions were to be implemented.

## 3.3.1 Thailand's Dairy Industry and GATT

The Thai government has encouraged domestic dairy producers to produce raw milk with the aim of reducing large amounts of imports of dairy products such as SMP, WMP, cheese, and butter oil. As the objectives of GATT as applied to Thailand's dairy sector, Thai government has to balance between competing aims in relation to its dairy product import policy as follows:

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[1] Tariffication involves converting NTBs to their tariff equivalents, and then progressively reducing tariffs, mainly for agricultural products.

- To promote fair trade under the trade agreement of GATT;

- To guarantee self-sufficiency of dairy products of good quality to the Thai market;

- To maintain the price of milk and dairy products as stable as possible and to avoid any inflationary pressures especially on lower income households; and

- To assist the promotion of the dairy farming in Thailand, and in particular, thousands of small local dairy producers (AFG, 1995).

In 1988, Thailand's import tariffs on dairy products had ranged from 10 to 218 per cent. The major imported dairy products were still ordered by Thai dairy importers. SMP, WMP, butter oil and whey products were to be used for producing recombined milk and for further processing into the full range of domestic dairy products (The Department of Customs, 1988-2004). SMP and butter oil was 25 per cent in the import duty. There has no particular limit on all averages of products allowed in dairy products imports.

In relation of domestic content requirement, however, producers of RTD milk for each import of dairy products have to buy locally produced raw milk. The Thai government has always support from its domestic dairy farmers. The stipulation under the requirement framework is that for production of any type of RTD milk every tonne of SMP has to use 20 tonnes of local raw milk. At the same time, in dairy products other than RTD, there was no restriction. Indeed, in comparison with the proportion, one in twenty in this system did not perform well because most processors produce both RTD and other dairy products. Most processes would be reported that imports of SMP and butter oil are to use for non-RTD products but at the same time would stack and use the imported products for RTD milk. In the mid 1980s, Thailand began to have problems with dairy products because of insufficient raw inputs for dairy product manufacturing and lack of the development of local raw outputs.

## 3.4 Thailand and WTO

In 1994, Thailand became the 59th member of WTO. The objectives of WTO agreement are the improvement of international trade rules, creation of stable economic environment and progressive liberalisation. Thailand, a relatively protectionist country in South East

Asia, had the commitment under its WTO membership to reduce import tariffs and to increase the volumes under import quotas in 1999 (Schroders, 1998). As part of the tariff reduction phase in 2004, duties will still be in the range of 30-40 per cent for processed food products, including the dairy products. Under the framework of WTO, a number of Thailand's import tariff rates were reduced to low rates, which are similar to its neighbouring countries such as Malaysia and Indonesia. Thailand has also accessed more new exports by increasing imports under the quotas. The annual import quota allocation is part of the Thai government's commitment with WTO.

In 1995, tariffs for imports into Thailand ranged from 0 to 100 per cent, including the effects of specific tariffs, with a simple average of 25.1 per cent. These did not include the extensive use of tariff concessions in connection with investment incentive schemes. At 38.6 per cent, the tariff average for agricultural raw materials was significantly higher than that for manufacturing at 22.6 per cent (WTO, 1995a). Tariff peaks based on the 4-digit SITC level did not include the effects of specific tariffs on knitted goods by 100 per cent, footwear by 100 per cent, rubber products and motor vehicles by 80 per cent. Tariff escalation is negative from first to intermediate processing, with average rates decreased from 27 to 20 per cent, but then returns to increase to 24 per cent for final processing. Tariff escalation is protective for such sectors as textiles, paper products, rubber-products, basic iron and steel products, and-ferrous metals and fabricated metal-products.

Meanwhile, in 1995, ad valorem tariffs and specific rates were applied to an estimated 161 lines, 2.5 per cent of overall tariff lines that emphasized on grains, edible oils, sugar, petroleum products and iron and steel. A further 1,845 tariff lines are subjected to alternative tariffs, for instance the higher ad valorem and a specific rate, equivalent to 29 per cent of total tariff lines. Categories at the 3 digit level with the highest percentages of alternative rates are tobacco by 100, beverages by 89 per cent, plastics by 87 per cent, and paper products by 68 per cent.

Import tariff reforms emerged in 1994, with the implementation commencing in 1995, would reduce the average applied tariff rate, according to the WTO authority from the

previous level of about 30 per cent in 1994 to 17 per cent by 1997. A number of tariff rates will be eliminated substantially (see Table 3.4). The total number of tariff lines involved in 1994 cuts was about 4,000 items. In 1995, ad valorem applied rates ranged from 0-100 per cent, together with substantial use of specific exception and differential treatment.

**Table 3.4: Restructure of Tariff Rates under Value-Added Escalation Principle in 1995.**

| Product | Import Tariffs |
|---|---:|
| Certain goods such as medical equipment and fertilizer | 0 |
| Raw Materials, Electronic Components, and Vehicle for International Transport | 1 |
| Primary and Capital Goods such as Machinery, Tools, and Computers; | 5 |
| Intermediate Goods | 10 |
| Finished Products and Air Conditioners | 20 |
| Goods that require additional protection | 30 |

**Source: WTO (1995a); DFAT (2003a).**

During the Thai fiscal year 1997-1998 the average tariff was 3.28 per cent, which declined from 5.5 per cent in 1997. The average trade weighted tariff was 10.37 per cent, which declined from 15.2 percent in 1997. Tariffs accounted for 5.85 per cent in the Thai government revenues in 1998, compared to 11.9 per cent in 1997. The decrease in the government revenues was due to lower tariffs on goods and services as well as the economic crisis resulting in the lower import levels. Additionally, tariff rates were gradually declined based on WTO commitments. As a result, in 1998 the petrochemical products tariff was reduced from 23.5 per cent to 21.75 per cent, and the tariff on plastic pellets declined from 32.62 per cent to 30 per cent. The products for which tariffs were reduced also include automobiles and auto parts, alcoholic beverages, some agricultural products, as well as distilled spirits (DFAT, 2003a).

Imports of fresh and processed foods attracted high ad valorem duties in Thailand. There are no longer specific import duties for most agricultural and food products. Average ad valorem rates are to decrease between 35 per cent and 50 per cent under the WTO

framework. However, import duties on a number of high-value fresh and processed food products will be as high as after current rates are reduced between 33 per cent and 50 per cent under WTO rules. Because most pre-WTO rates were approximately 60 per cent, this will leave many items within the 30 to 40 per cent range by 2004 (The Department of Customs, 1988-2004). Furthermore, Thailand's tariff rate quota for several agricultural products was adjusted in 1996. For example, the quota for soybeans was eliminated. Despite having a strong agricultural economy, Thailand still has some though lower tariffs on some agricultural and food products beyond its WTO commitments.

Moreover, the Thai government has continued to reduce tariff rates, based on the WTO schedule established in 1994. However, during the economic crisis from 1997-1998 there was a shortfall of government revenue. Then the Thai government increased import tariffs and excise taxes on many goods. For instance, tariffs on tobacco were increased from 30 to 60 per cent and those on woollen textiles, perfumes, cosmetics, and some leather products were raised from 10 to 40 per cent. The tariffs on crystal glassware and certain steel products were increased at 35 and 5 per cent, respectively (WTO, 1999b). The Thai government also applied a temporary surcharge of 10 per cent on overall imports with a custom duty of 5 per cent or greater. None of these tariff increases or surcharges appears to violate Thailand's WTO tariff binding commitments.

In 1995, applied tariffs on imports of live animals ranged from 0 to 40 per cent, not including specific rates, with a simple average of about 15 per cent followed by Uruguay Round rates in 2004. Previous non-tariff barriers to imports of not-for-processing milk and cream (together with flavoured milk) are subject to tariffication. The tariff rate for quota imports is 20 per cent while above quota imports face an initial rate of 41 per cent, declining to 40 per cent by 2004. The initial quota level is for about 2,286 tonnes, rising to 4,000 tonnes by 2004 (DFAT, 2003).

## 3.4.1 Thailand's Dairy Industry and WTO

Based on WTO commitments, Thailand has begun to open the market to increase the import quotas and reduce import tariffs of many dairy products such as SMP, non-dry

milk (NDM), RTD, fresh milk, butter and cheese since 1995 ending in 2004. Due to protection and promotion of the domestic dairy industry, the Royal Thai government (RTG) has manipulated the price guarantee program, the import quota allocation used for domestic milk, and domestic raw milk in the contracted school milk program (Preechajarn, 1999-2003). The rates within the SMP quota were fixed at 5 per cent and were expected to remain at this level for 1995. This rate has been in effect since 1985. The import tariff rate on WMP is 5 per cent. Thailand's WMP import levels became small and particularly low in volume in comparison to imports of SMP. It is essential that WMP remains more costly than SMP (70-80 baht/kilogram for WMP and at 50-60 baht/kilogram) (WTO, 1955b). WMP is reconstituted so that the price of WMP is significantly higher than that of domestically produced raw milk.

The tripartite sub committee of Thailand's dairy industry was set up in 1995 with the aims stemming from the National Livestock Development (NLD) and policy committee under the Ministry of Agricultural Cooperation (MOAC). They developed an agreement to focus on liquid milk and skim milk powder (SMP) proportion fixing system to be replaced by an import quota system. Due to local raw material shortages within the domestic dairy industry, a large amount of imports were allowed to fall within quotas by the tripartite sub-committee. During 1995, approximately 12,390 tonnes of SMP were imported at the rate of 5 per cent, and the aggregate import quota for 1995 amounted to 67,390 tonnes (AFG, 1995).

Based on the GATT and WTO commitments, there are minimum quota levels, which Thailand might adopt for two of the main products. Import quotas of SMP and liquid milk have increased substantially from 2,286 and 45,000 tonnes in 1995 to 2,400 and 55,000 tonnes, respectively in 2004 (AFG, 1995). The tripartite sub-committee has further agreed to import from non-WTO member countries that would not be eligible for the lower level of quota tariff rates. There would be 1 per cent annual reduction in the quota rate applied. Imports of liquid milk or SMP from non- WTO member countries are subjected to the 46 per cent and 240 per cent rates and the ratio for these countries are not expected to decline in the future.

Thailand must follow the WTO commitments within the import quota tariffs of 20 per cent. The option involved the tripartite sub-committee's perspective of the country based on imports necessary for local milk production capacity emphasized on the shortfall of dairy products. This needs to be monitored as Thailand falls under the group of developing nations based on GATT that will be allowed to maintain high tariffs and import quotas for dairy products for the aim of protection and development of its domestic dairy industry. The import quotas were introduced at the end of 1994 when the WTO agreement was signed. Import tariffs on dairy products were set between 25 per cent and 240 per cent for liquid milk, SMP, WMP, butter, cheese, whey products. The agreement stipulates that Thailand will reduce the tariff rate by 1 per cent per year to achieve the target in the year 2004.

In 1997, National Livestock Policy and the Development Committee of Thailand followed the commitments of WTO Ministerial meeting in 1996 to increase the quota allocation for SWP at an aggregate of 88, 000 tonnes. The regulations that Thailand has adopted for dairy importers in the meeting are as follows:

- Thailand will be open for imported SMP with 5 per cent tax rate in quota and 232.8 per cent for out of quota imports; and

- Thailand will accept new raw milk and UHT milk at the quota of 2,285.05 tonnes and 2,628 tonnes, respectively. Import tariff rates at 20 per cent in quotas will also be applied to both products. For those of non-quota, 44 per cent and 90.30 per cent will be applied to raw milk and ultra heat treated (UHT) milk (AUSTRADE, 1997).

Thailand has been unable to produce a sufficient quantity of raw milk to be used in processing by the domestic dairy industry. The Thai government allowed the increase of import quotas of raw milk by 2,279.51 tonnes, RTD by 2,628 tonnes and SMP by 88,000 tonnes in 1999 (FIBR, 1999). As presented in Table 3.5 the Thai government has increased import quotas of milk and cream in powder consisting of SMP to 55,000 tonnes and imposed quota tariff at 20 per cent to support domestic dairy processing during 1995-2004. Over the same period, imports of milk and cream (liquid milk and crème) have been allowed at 2,400 tonnes with 20 per cent of the quota tariff.

**Table 3.5: Thailand's Quota Allocation in Dairy Products**

| Description of Product | Tariff Rate Quota | | Implementation Period |
|---|---|---|---|
| | Quantity (tonnes) | In Quota Tariff | |
| Milk and cream, concentrated or containing added sugar or their sweetening matter, in powder, granules or other solid forms, or a fat content, by weight, not exceeding 1.5% (SMP) | 55,000 | 20% | 1995-2004 |
| Milk and cream, concentrated or containing added sugar or their sweetening matter (Liquid milk and Cream) | 2,400 | 20% | 1995-2004 |

**Source: ADC (2001).**

The Thailand cabinet announced 2,374.67 tonnes of import quotas on milk products and fresh milk in 2002. Forty two per cent non-quota product tariff and 20 per cent quota product tariff will be on 2,347.69 tonnes of fresh milk. SMP in import quota was set at 73,000 tonnes, with 18,000 tonnes going to the central quota and 55,000 tonnes for importers. The import tax was fixed at 5 per cent for imports within quota and 220.8 per cent for quota excesses (Thailand Media, 2003). In 2004, the import quota of RTD and raw milk would increase to 2,400 tonnes, with an import quota tariff rate of 20 per cent. The Thai government specified four categories of dairy products for which imports of milk powder are allowed and eligible to apply for part of the quotas as follows:

- Sweetened condensed milk manufactures;
- UHT product manufactures and milk depots importing milk powder on behalf of the Thai government (the Thai government is endeavouring to control and limit the amount in per cent of milk powder in UHT tariff products);
- Importers of milk powder, who have a proven and continuous track record of importing from 1991 onwards; and
- Processed dairy manufactures, producing bakery products, cheese and other processed dairy products (AUSTRADE, 1998).

Thailand has scheduled to increase minimum import quotas for non-dry milk (NDM) for the use in processed fluid milk, condensed milk, chocolates and ice cream from 45,000 tonnes in 1995 to 55,000 tonnes in 2004. Taxes for NDM import quotas are set at 20 per cent from 1995 to 2004, while for non-import quotas will decline from 237.6 per cent in 1995 to 216 per cent in 2004. However, the tariff rate quota is to be issued by the Thai government since 1995 has been in the WTO commitment as reduction of tariff rate quota (TRO) to 5 per cent. For instance, the TRO in 1998 was 88,000 tonnes, as opposed to an amount of 48,333 tonnes. Import quota in 1999 was 65,000 tonnes (Preechajarn, 1999-2003). Even though the Thai government has allocated the TRQ import quota based on the WTO schedule, a problem in relating to import quota allocation is the practice of delay in quota allocation. These stipulate two quota allocations, the time of NDM shipment for Thailand would be January and June as the first quota slot, as well as July to December as the second slot. Nevertheless, the delayed announcement of quota allocation propelled for importers and producers to have a month left to actually ship the products.

The Thai Dairy Industry (TDI) has been protected through both quantitative and tariff restrictions from the cheaper imported dairy products. Imported dairy products were subject to a range of customs duties and other taxes. In this case, customs duties range from 10 per cent of cost, insurance and freight (c.i.f.) value for milk powders for infant formula and to 60 per cent for cheese (Dairy Market Briefings, 1993). Thailand also has high tariff rates which perform as the Thai government revenue generators rather than for local dairy industry support. Nevertheless, by significantly increasing prices to local consumers, these duties inhibit consumption and sales growth in specific market segments.

Table 3.6 exhibits differential ad valorem rates for Thailand's dairy product imports. Although Thailand has committed the dairy products to be under WTO rules, its dairy imports has been subjected to high level of ad valorem tariffs to protect the domestic dairy industry, In 2003, an average of ad valorem rate was around 41.25 per cent, and the highest level for butter and dairy spreads at 60 per cent. Milk and cream (of a fat content, by weight, not exceeding 1 %) consisting of SMP, yoghurt and whey products have the

same ad valorem rate at 40 per cent. Twenty five per cent is the lowest ad valorem rate for butterfat and milk and cream (in powder).

**Table 3.6: Ad Valorem Tariff on Thailand's Dairy Product Imports (2003)**

| Description | Ad Valorem (%) |
|---|---|
| Milk and cream, not concentrated nor containing added sugar or other sweetening matter. Of a fat content, by weight, not exceeding 1 % | 40 |
| Milk and cream, not concentrated nor containing added sugar or other sweetening matter. Of a fat content, by weight, not exceeding 1 % but not exceeding 6% | 40 |
| Milk and cream, not concentrated nor containing added sugar or other sweetening matter. In powder, granules or other solid forms, of a fat content, by weight, not exceeding 1.5% | 25 |
| Butter, cream powdercurdled milk and cream, yoghurt, kephir and other fermented or acidified milk and cream, whether or not concentrated or containing added sugar or other sweetening matter | 40 |
| Whey, whether or not concentrated or containing added sugar or other sweetening matter; products consisting of natural milk constituents, whether or not containing added sugar or other sweetening matter, not elsewhere specified or included. | 40 |
| Butter | 60 |
| Dairy spreads | 60 |
| Butterfat | 25 |

**Source: Department of Customs (2003).**

The dairy product imports based on customs duties are also subjected to business taxes. These are to levy at the rate of 1.5 per cent of the Gross Receipt Value (GRV) for imports of SMP, butter oil and whey powders and 9 per cent for other dairy products. Municipal

taxes are at 10 per cent of the business tax amount, while GRV of dairy product imports is computed as the landed, duty paid (c.i.f) import value and an assumed amount, termed the Standard Profit Rates (SPRs). SPRs for the major dairy products ranged between 5 and 11 per cent of the landed c.i.f price in 1992 (Dairy Market Briefing, 1993).

Table 3.7 shows that tariffs on the major dairy product imports of Thailand have been set for SMP, WMP, butter, and cheese at 25, 40 and 60 per cent, respectively since 1988. In particular, SMP rose to the highest level at 237.6 per cent due to an increase in demand for domestic dairy processing in 1995. Under GATT and WTO regulations, the reduction of dairy import tariffs was expected by 2004 to decline through lower rates compared to previous years. However, the tariffs for liquid milk, yoghurt and butter oil have been fixed at the same level and have not changed since 1988. SMP had the highest level of import tariff, and was expected to reduce for above quota from 237.4 per cent in 1995 to a 216 per cent targeted in 2004. In contrast, tariff for WMP declined sharply from 25 per cent at the beginning of trade barrier policy to 5 per cent in 2004.

**Table 3.7: Thailand's Import Tariffs on Dairy Products (% of c.i.f price)**

| Dairy Product | Prior to 1988 | Since 1988 | For 1995 | | Target 2004 |
|---|---|---|---|---|---|
| | | | WQ | AQ | |
| Powdered Milk | 40 | 40 | 20 | 45.5 | 41 |
| SMP | 25 | 5 | 5 | 237.6 | 216 |
| WMP | 25 | 5 | 5 | | 5 |
| Liquid or Condensed | 40 | 30 | 30 | | 30 |
| Butter Oil | 40 | 30 | 30 | | 30 |
| Butter, Processed | 60 | 60 | 60 | | 60 |
| Cheese or Curd | 60 | 60 | 60 | | 60 |

**WQ is the weighted quota and AQ is above quota.**
**Source: AFG (1995).**

As displayed in Table 3.8, there are two major dairy products, butter and cheese, for which tariffs reduced significantly from 60 per cent in 1988 to 33 per cent in 2003. Even though the WTO's expectation was to reduce tariffs as much as it can, applied tariffs in 2003 was still high at 216 per cent for milk and cream. As shown in Table 3.9, Thailand's trade protection for the domestic dairy industry has been through heavy import tariffs, and value added taxes (VAT). Most of the dairy products (cheese, milk and crème, milk powder, yoghurt) have been subjected to 10 per cent VAT. In other words, the Thai government thus encouraged local producers to use import substitution with local raw materials.

**Table 3.8: Thailand's Import Tariffs on Dairy Products (2003)**

| Dairy Product | Tariff (%) |
|---|---|
| Milk and cream, not concentrated nor containing added sugar or other sweetening matter. Of a fat content, by weight, not exceeding 1 % | 40 |
| Milk and cream, not concentrated nor containing added sugar or other sweetening matter. Of a fat content, by weight, not exceeding 1 % but not exceeding 6% | 40 |
| Milk and cream, not concentrated nor containing added sugar or other sweetening matter. In powder, granules or other solid forms, of a fat content, by weight, not exceeding 1.5% | 216 |
| Butter, cream powdercurdled milk and cream, yoghurt, kephir and other fermented or acidified milk and cream, whether or not concentrated or containing added sugar or other sweetening matter | 5 |
| Whey, whether or not concentrated or containing added sugar or other sweetening matter; products consisting of natural milk constituents, whether or not containing added sugar or other sweetening matter, not elsewhere specified or included. | 30 |
| Butter | 33 |
| Cheese and Curd | 33 |

**Source: ADC (2003a).**

**Table 3.9: Tariffs and Taxes: Import Duties and VAT on Dairy Products (1988)**

| Dairy Products | Tariff (%) | Taxes and VAT |
|---|---|---|
| Cheese | 60 | 20 baht / kilogram, whichever and 10 percent VAT |
| Raw Milk | 20<br>5 | VAT exemption,<br>Applies to amounts exceeding the quota |
| Milk and Cream in Powder | 5<br>232.8 | 10 per cent VAT<br>Applies to amounts exceeding the quota |
| Milk fit for Infants | 5<br>20<br>90.3 | 10 per cent VAT<br>Plus 10 per cent VAT<br>Applies to amount that exceed the quota, plus 10 percent VAT |
| Yoghurt | 30 | Plus 10 per cent VAT |

**Source: AUSTRADE (1998-1999).**

In addition, one of the key factors influencing dairy product exports to Thailand is the domestic content requirement applicable on all the dairy products imported by Thailand, such as milk, butter, SMP, WMP, and cheese. Thailand's regulations have required that the dairy importers to buy 2 kilograms of local raw milk for every kilogram of imported milk or milk equivalent. Ten kilograms of milk powder are also classed as equal to 1 kilogram of milk equivalent. Meanwhile, the Thai government proposed that overall local milk operations must use at least 10 units of domestic milk for each unit of imported milk powder used in production. All the importers of SMP have also to purchase 20 times the weight of imported milk powder in local raw milk (Dairy Market Briefing, 1993).

In the case of prepared milk, the local content requirement is 2 to 1. Additionally, producers of powdered milk have to buy at least 50 tonnes of local raw milk per day in the first year of operation. Producers of prepared milk have to use raw milk with recombined milk in ratio of 1 to 1. Also both kinds of producers of powdered milk would increase their purchases of raw milk around 20 per cent per year (WTO, 1999a). In 1995 imports of fresh milk and beverages were subjected to non-automatic licensing, under which importers were required to buy 2 parts of the local product for each part of imported products. Given the differentials of quality and price of locally produced milk, butter, SMP and WMP, these measures added considerably to domestic processing costs and the growth in demand for imports. However, local content requirement has been eased, as local supplies of low milk have not been able to keep up with overall demand. Thailand has undertaken to eliminate the local content requirements by the end of 1999 in order to maintain its obligations listed in the Uruguay Round Agreement of GATT (Podbury et al, 1993).

Some dairy product importers such as ghee product importers need to be licensed from the Thailand Food and Drug Administration (TFDA). Additionally, local dairy imports have to follow regulations pertaining to food standards and labelling requirements. All the dairy exporters are expected to verify labelling requirement with the Thai import authorities. The restrictive requirements governing the labelling of dairy products would apply. All dairy product imports have to be labelled (or have a sticker) in the Thai language with the trade name of the foodstuff in both generic and trade, name and address of the manufacturer, name and address of the importer, dates of manufacture and expiration, net weight of contents and list of main ingredients.

## 3.5 Conclusion

Thailand's trade policy has been developed as part of and in conjunction with its economic policies. During the 1960s, the Thai government used import substitution to replace imported goods by domestic production. In development of the economy and the industries, Thailand also had the seven principal plans based on the 1st-7th National Economic and Social Development Plans (NESDP) during 1967-1996. The overall plans

emphasized the use of local raw materials and labour intensive techniques, changing from import substitution to promotion of exports, encouraging export processing zones, focusing on industrial adjustment, encouraging small scale industries and the diversification into the export markets.

The characteristic of tariffs in Thailand has been tariff escalation, which is increasing average level of tariffs with each stage of value adding. Thus, raw materials were at lower tariff rates, and finished products were at higher rates. The effective rates of protection (ERP) were higher than the implied nominal tariff rates. In the 1970s, tariff rates steadily increased because of the balance of payment problems. Thailand also had an exemption of tariff on specific products, and utilised a range of non-tariff barriers on imports.

In 1982, Thailand became a member of GATT. The Thai government followed GATT rules to reduce import tariffs. At the conclusion of the Uruguay Round of GATT at the end of 1994, all the import tariffs changed for overall manufacturing and processed products, including dairy products. Thailand became the 59th member of WTO in 1994. The major aims were the improvement of international trade rules, creation of a stable economic environment and progressive liberalisation of international trade. As part of the tariff reduction phase in 2004, duties will still be in the 30-40 per cent range for processed food products, including all the dairy products. For example, the highest level of tariffs for above quota imports of SMP was expected to reduce from 237.4 per cent in 1995 to 216 per cent target in 2004. Thailand's import tariff rates on many imported goods will be reduced further. Thailand had also accessed many new export markets by increasing its import quotas.

Domestic content requirements imposed on importers of dairy products were to be eliminated by the end of 1999. SMP importers had to buy 20 times the weight of imported powder in local raw milk equivalent. In prepared milk, the local content requirement is 2 to 1. Thailand was also to eliminate the local content requirement in

order to comply with the trade negotiations in the Uruguay Round Agreement of GATT, but only succeeded in eliminating a small number.

The next Chapter (Chapter 4) will investigate Australia's dairy exports with special reference to exports to Thailand. The trends in the volume of Australia's dairy product exports worldwide will be discussed. Australia's dairy product exports to the Thai market will be particularly emphasised. Based on the economic relationship between Australia and Thailand leading to an increase in trade between the two countries, the expected outcomes of Australia-Thailand Free Trade Agreement (FTA) will also be examined.

# Chapter 4

# Australian Exports of Dairy Products to Thailand

## 4.1 Introduction

Australia exports dairy products worldwide to Asia-Pacific, Middle East, Africa, Former Soviet Union countries and the Americas. Nevertheless, Australia's dairy product exports were less than those of the European Union (the EU) and New Zealand in 2000. Australia's exports of dairy products have also fluctuated substantially over the period 1980-2001. The largest shares of Australia's dairy product exports in 1999 were to Asia and in particular to South East Asia at 27.15 and 40.02 per cent, respectively. Among South East Asian countries, Thailand, with 62.19 million of population, is a sizable market for Australian dairy products. However, the average market share of Australia's dairy product exports in Thailand was 22.7 per cent in 1998, which followed the share of New Zealand by 24.2 per cent. Therefore, it is necessary to examine Australia's exports of dairy products to Thailand in order to identify the reasons for the lower market share of Australia and to identify opportunities for Australia to increase the market share.

Section 4.2 of this chapter discusses the trends in Australia's dairy production. The trends in the volume of Australia's exports of dairy products worldwide are discussed in Section 4.3. Australia's dairy product exports to Thailand are described in Section 4.4, which consists of two major parts as follows; Section 4.4.1 describes economic relationship between Australia and Thailand, and examines the expected outcomes of Australia-Thailand Free Trade Agreement (FTA). Section 4.4.2 discusses Australia's exports of dairy products to Thailand. Conclusions are included in Section 4.5

## 4.2 Dairy Production of Australia

Australia's dairy industry is a major industry, which contributes to the national economy in terms of farm-gate value of production, after the wheat and beef industries (Jahan et al, 2000). Australia's dairy processing industry has also become a significant part of the value-adding manufacturing. 1n 2000, one fifth of the milk produced has been consumed

in the domestic market as drinking milk, while 80 per cent has been exported as manufactured dairy products, for example cheese, SMP, WMP, butter and whey products. The estimated gross value of dairy production at farm-gate is around A$3 billion per year (ABARE, 2001). The estimated dairy industry output was around A$8 billion in 1999-2000. After 1973, Australia entered the U. K market, which is the largest market for Australia in the EU. Australia's dairy industry became more internationally competitive and significantly expanded with new trade links. This was also stronger by the beginning of the Kerin Plan in 1986 that related to domestic product prices to international market returns. In 2000, over 50 per cent of Australia's milk production went for manufactured dairy products (ADC, 1989-2000).

Australia's climate and natural resources are favourable to dairying that permits production under year-round pasture grazing. These contribute to the advantage of low cost milk production. Pasture growth also generally depends on natural rainfall. Most non-irrigated dairy production is in coastal fringe areas. Feed lot-based dairying remains unusual in Australia, although in use of supplementary feed, for example grains, has become common. In Australia, many farms have over 200 cows. Individual farmers rear replacement stock. It is common for dairy farmers to maintain a small beef herd to supplement their dairy income. Following the pasture-based production system, Australia's milk output depends on a seasonal pattern, and has a peak of production in October-November. In those states with a greater dependence on liquid milk sales (New South Wales, Western Australia, Queensland and South Australia) the seasonality is less pronounced, as farmers manage calving and feed systems to make sure more even year-round production (ADC, 1989-2002) Victoria has around 62 per cent of total dairy production, and dominates the production and export of manufactured dairy products.

As shown in Figure 4.1 and Table 4.1, the number of dairy cows in Australia increased from 1,654,00 head in 1990 to 2,170,000 head in 2000 indicating an increase of around 31 per cent over the period. The whole milk output increased from 6,262,000 tonnes in 1990 to 10,847,000 tonnes in 2000, an increase of about 71 per cent increase over the period. The processed dairy product output increased from 512,000 tonnes in 1990 to

1,061,000 tonnes in 2000, an increase of about 107 per cent over the period. Additionally, the national dairy herd has risen dramatically.

**Figure 4.1: Production Trends of Australia's Dairy Products**
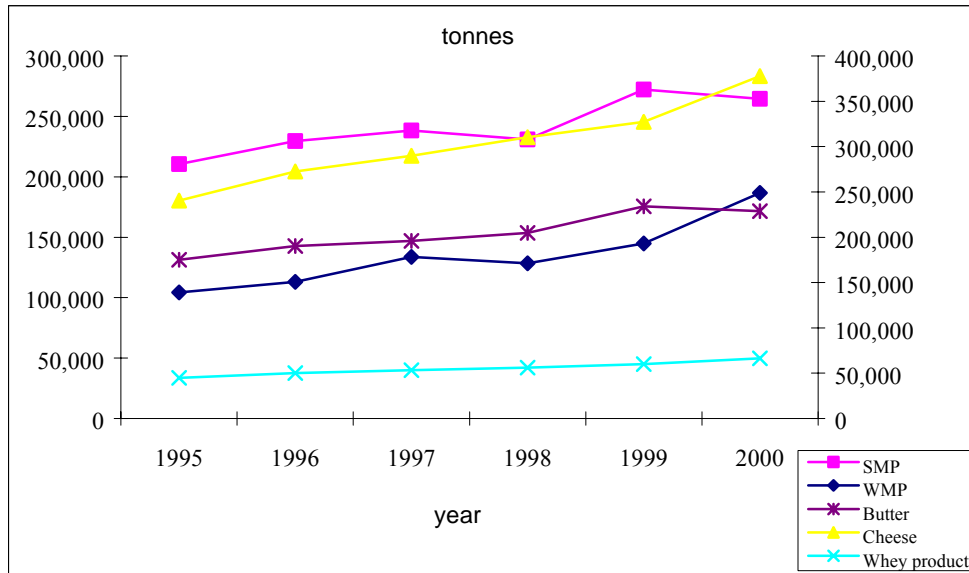


**Source: ADC, 1989-2002 .**

**Table 4.1: Number of Dairy Cows, Whole Milk Output, and Processed Dairy Product Output in Australia (1990-2000)**

| Year | Number of Dairy Cows ('000 head) | Whole Milk[1] Output ('000 tonnes) | Processed Dairy Product Output ('000 tonnes) |
|------|------|------|------|
| 1990 | 1,654 | 6,262 | 512 |
| 1991 | 1,638 | 6,403 | 530 |
| 1992 | 1,653 | 6,732 | 578 |
| 1993 | 1,697 | 7,325 | 645 |
| 1994 | 1.787 | 8,079 | 740 |
| 1995 | 1,882 | 8,206 | 731 |
| 1996 | 1,884 | 8,714 | 807 |
| 1997 | 1,977 | 9,036 | 862 |
| 1998 | 2,060 | 9,440 | 878 |
| 1999 | 2,155 | 10,179 | 980 |
| 2000 | 2,170 | 10,847 | 1,061 |

**1**. Whole milk is milk, packaged for drinking, is standardized to a milk fat content of around 3.8 per cent. Modified, reduced and low fat milks are standardized to other specifications and have varying milk fat and bottled as table cream or manufactured into butter or other dairy products (ADC, 2000-2002).

**Source: ADC (1989-2000); ADC (2000-2002); ABARE (1995-2001).**

## 4.3 Trends in Australia's Dairy Product Exports in General

As shown in Table 4.2, Australia exports a major proportion of its dairy output. The dairy product exports increased from about 2,96,000 tonnes in 1990 to about 7,82,000 tonnes in 2000.The dairy product exports enjoyed 45 per cent increase in 1995-1996. The growth of exports among the top 10 per cent of companies reached 61 per cent in 1998-1999. Over the same period, the exports of milk and cream actually declined, with the top 10 per cent of firms accounting for 37 per cent of sales in 1998-1999 compared with 51 per cent in 1995-1996 (Nilufar et al, 2003). Australia's dairy product exports were the largest part among processed food exports, resulting in $A3.04 billion of export sales in 2000-

2001 (ABARE, 2001). Currently, Australia is the world's third largest dairy product exporter after the European Union (EU) and New Zealand (see Figure 4.2).

**Table 4.2: Australia's Exports of Dairy Products (1990-2000)**

| Year | Dairy Product Exports (000' tonnes) | Exports as % of Production |
|------|-------------------------------------|---------------------------|
| 1990 | 295.9 | 57.79 |
| 1991 | 353.8 | 66.75 |
| 1992 | 368 | 63.66 |
| 1993 | 411.3 | 63.76 |
| 1994 | 505.5 | 68.31 |
| 1995 | 484.9 | 66.33 |
| 1996 | 460.8 | 57.10 |
| 1997 | 556.9 | 64.60 |
| 1998 | 556.8 | 63.41 |
| 1999 | 677.1 | 69.09 |
| 2000 | 782.2 | 73.72 |

**Source: ADC (1989-2000); ADC (2000-2002); ABARE (1995-2001).**

In terms of exports, milk dry, including skim milk powder (SMP), cheese, and butter are the principal dairy product exports of Australia, and as percentages of total exports 52.75, 29.38 and 13.87 per cent, respectively in 2001 (see Table 4.3). Butter and whey products are principal contributors to industry export returns. Australia's dairy products have been exported worldwide to Asia (the largest dairy importer), Pacific, Middle East, Africa, Europe and the Americas (ADC, 2000). The direction of Australian export sales differs from the general pattern of its international trade flow. Australian dairy product exports also have grown steadily and accounted for about 73.72 per cent of total production of dairy products in 2000 (see Table 4.2).

**Figure 4.2 Shares of Dairy Product Exporting Countries in World Dairy Trade (2002)**
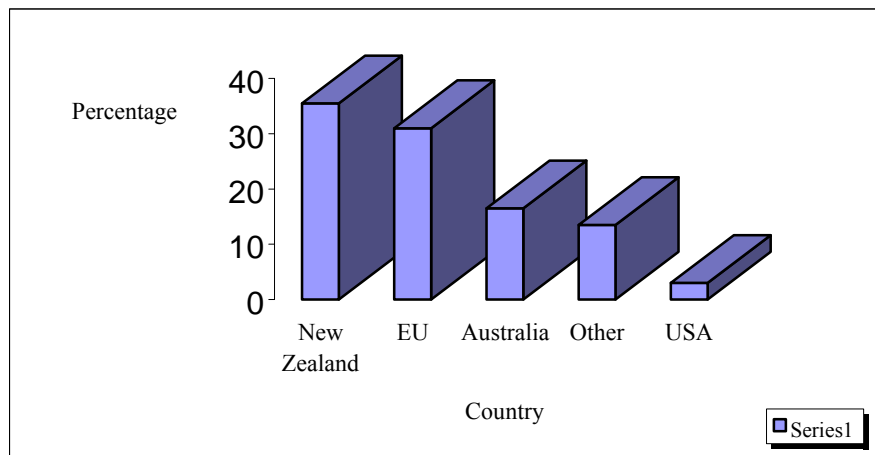


**Source: ADC, 2003, Australian Dairy Industry, In Focus 2003, ADC, Melbourne.**

Australia's dairy product exports to the world market during 1980-2001is shown in Table 4.3. Milk dry has been at the highest value of exports, for example at 60.42 per cent of total exports in 1991. Milk dry exports steadily increased from 40.41 per cent of total exports in 1980 to 52.75 per cent of total exports in 2001. Cheese and butter exports ranked at the second and third at 29.30 and 13.87 per cent of total dairy exports, respectively in 2001. Whey products, milk condensed and evaporated milk remained at a low level of exports, which were at 5.40 and 4.00 per cent, respectively in 2001. Australia's butter exports to the world market as a share of its total exports of dairy products have sharply declined during the period 1980-2001. The reasons for this declining trend of butter export share could be subject to investigation in another (future) study.

**Table 4.3: Australia's Dairy Product Exports to the World Market (1980-2001)**

| Year | Milk Condensed and Evaporated | | Milk Dry | | Butter | | Cheese | | Whey Products | | Total Dairy Product Exports | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Volume (metric tonnes) | % of Total Dairy Product Exports | Volume (metric tonnes) | % of Total Dairy Product Exports | Volume (metric tonnes) | % of Total Dairy Product Exports | Volume (metric tonnes) | % of Total Dairy Product Exports | Volume (metric tonnes) | % of Total Dairy Product Exports | Volume (metric tonnes) | Percentage |
| 1980 | 14,131 | 6.77 | 83,716 | 40.14 | 49,571 | 23.76 | 61,134 | 29.31 | 4,211 | 2.02 | 208,552 | 100 |
| 1985 | 2,708 | 1.06 | 141,660 | 55.56 | 42,989 | 16.86 | 67,610 | 26.57 | 3,774 | 1.48 | 254,967 | 100 |
| 1990 | 2,417 | 0.90 | 160,509 | 59.80 | 49,569 | 18.46 | 55,920 | 20.83 | 12,187 | 4.54 | 268,415 | 100 |
| 1991 | 3,063 | 1.03 | 179,723 | 60.42 | 50,621 | 17.02 | 64,008 | 21.52 | 10,634 | 3.57 | 297,415 | 100 |
| 1992 | 3,301 | 1.09 | 179,620 | 59.17 | 51,328 | 16.91 | 69,304 | 22.83 | 20,264 | 6.67 | 303,553 | 100 |
| 1993 | 4,661 | 1.30 | 199,226 | 55.40 | 69,606 | 19.35 | 86,100 | 23.94 | 26,100 | 7.26 | 359,593 | 100 |
| 1994 | 7,338 | 1.60 | 260,402 | 56.84 | 85,657 | 18.70 | 104,717 | 22.86 | 21,018 | 4.59 | 458,114 | 100 |
| 1995 | 14,212 | 2.83 | 290,052 | 57.72 | 81,914 | 16.30 | 116,300 | 23.14 | 31,479 | 6.26 | 502,478 | 100 |
| 1996 | 25,510 | 4.50 | 323,213 | 56.93 | 83,781 | 14.75 | 135,157 | 23.81 | 35,071 | 6.18 | 567,661 | 100 |
| 1997 | 14,431 | 2.32 | 340,812 | 54.84 | 116,184 | 18.70 | 149,974 | 24.13 | 32,393 | 5.21 | 621,401 | 100 |
| 1998 | 22,829 | 3.45 | 356,833 | 53.96 | 99,761 | 15.08 | 182,039 | 27.52 | 40,011 | 6.05 | 661,462 | 100 |
| 1999 | 37,512 | 4.76 | 396,966 | 50.36 | 145,164 | 18.42 | 208,230 | 26.43 | 43,372 | 5.50 | 787,872 | 100 |
| 2000 | 25,087 | 3.15 | 423,182 | 53.17 | 114,849 | 14.43 | 232,735 | 29.24 | 38,930 | 4.90 | 795,853 | 100 |
| 2001 | 27,988 | 4.00 | 370,405 | 52.75 | 97,411 | 13.87 | 206,303 | 29.38 | 37,904 | 5.40 | 702,107 | 100 |

**Source: FAO Trade Yearbook (1980-2001).**

Australian exports of dairy products to South East Asia and other Asian countries accounted for about 41.12 and 27.15 per cent to their total imports of dairy products, respectively in 1999 (see Table 4.4 and Figure 4.3). Japan, the Philippines, Malaysia, Singapore, Thailand and Taiwan are the major importers of Australia's dairy products, and their imports account for approximately 55 per cent of Australia's total exports (ADC, 2000-2002). The bulk of Australia's dairy products are exported to the Asian countries, mainly due to Australia's closer geographical location to the region.

China has emerged as a powerful export market for Australian dairy product in Asia. China's annual consumption of dairy products is estimated at 6,000 tonnes and imports are estimated at 20 per cent of the total consumption requirements (Kidane and Gunawardana, 1999). The Philippines, Taiwan and Malaysia are the principal destinations for Australian export sales of whole milk powder. Recently, South East Asian market, notably Singapore, Hong Kong, and the Philippines have emerged as important markets for Australian liquid cream exports. Australia is also exporting increasing volumes of yoghurt, ice cream, cheese and other dairy products in consumer friendly packs (ADC, 1989-2000).

As mentioned earlier, Australia exports dairy products to Asia-Pacific, Middle East, Africa, Europe, Former Soviet and the Americas (see Table 4.4 and Figure 4.3). The volume of dairy production in Australia accounts for 2 per cent of world output. Nevertheless, Australia is the third largest exporter of dairy products, after the European Union (EU) and New Zealand. Australia accounted for about 16 per cent of world exports of processed dairy products in 2002 (ADC, 2003b). The largest share of the Australian exports of dairy product was to South East Asia at 31.18 per cent in 2000.

**Table 4.4: Exporting Country Shares of world Markets of Selected Dairy Products[1] in 2000**

Tonnes and **(percentage)**

| Exporter | Australia | New Zealand | EU | U.S.A | Others | Total Imports | % |
|---|---|---|---|---|---|---|---|
| Africa | 53,268 **(9.45)** | 70,404 **(12.50)** | 384,193 **(68.20)** | 13,089 **(2.32)** | 42,423 **(7.53)** | 563,377 **(100)** | **(12.00)** |
| Americas | 60,442 **(4.97)** | 237,535 **(19.53)** | 440,532 **(36.23)** | 187,643 **(15.43)** | 289,888 **(23.84)** | 1,216,041 **(100)** | **(26.23)** |
| South East Asia | 258,106 **(31.18)** | 292,492 **(35.33)** | 198,262 **(23.95)** | 50,086 **(6.05)** | 28,877 **(3.49)** | 827,824 **(100)** | **(17.64)** |
| Other Asia | 220,284 **(28.98)** | 235,619 **(31.00)** | 179,771 **(23.65)** | 72,496 **(9.54)** | 51,899 **(6.83)** | 759,753 **(100)** | **(16.19)** |
| Middle East | 71,998 **(13.32)** | 106,403 **(19.69)** | 322,570 **(59.68)** | 8,711 **(1.61)** | 30,759 **(5.69)** | 502,956 **(100)** | **(11.51)** |
| Europe | 49,522 **(12.32)** | 120,767 **(30.05)** | 65,234 **(16.23)** | 4,308 **(1.07)** | 162,035 **(40.32)** | 401,864 **(100)** | **(8.56)** |
| Former Soviet Union | 9,012 **(3.15)** | 32,868 **(11.51)** | 141,786 **(49.64)** | 31,532 **(11.04)** | 70,415 **(24.65)** | 285,616 **(100)** | **(6.09)** |
| Pacific | 9,218 **(9.04)** | 59,905 **(73.05)** | 10,618 **(12.95)** | 585 **(0.71)** | 1,684 **(2.05)** | 82,009 **(100)** | **(1.75)** |
| Other | 7,684 **(47.40)** | 1,000 **(6.17)** | 5,381 **(33.19)** | 1,242 **(7.66)** | 902 **(5.56)** | 16,211 **(100)** | **(0.13)** |
| Total | 739,533 **(15.75)** | 1,156,995 **(24.65)** | 1,748,347 **(37.26)** | 369,692 **(7.88)** | 678,886 **(14.46)** | 4,693,450 **(100)** | **(100)** |

**1. Butter, Butter Oil, SMP, WMP, Cheese, and Whey Powder.**
**Source: ADC, 1989-2000, dairy Compendium, ADC, Melbourne.**

**Figure 4.3: Percentages of Australia's Dairy Product Exports by Region (1999)**
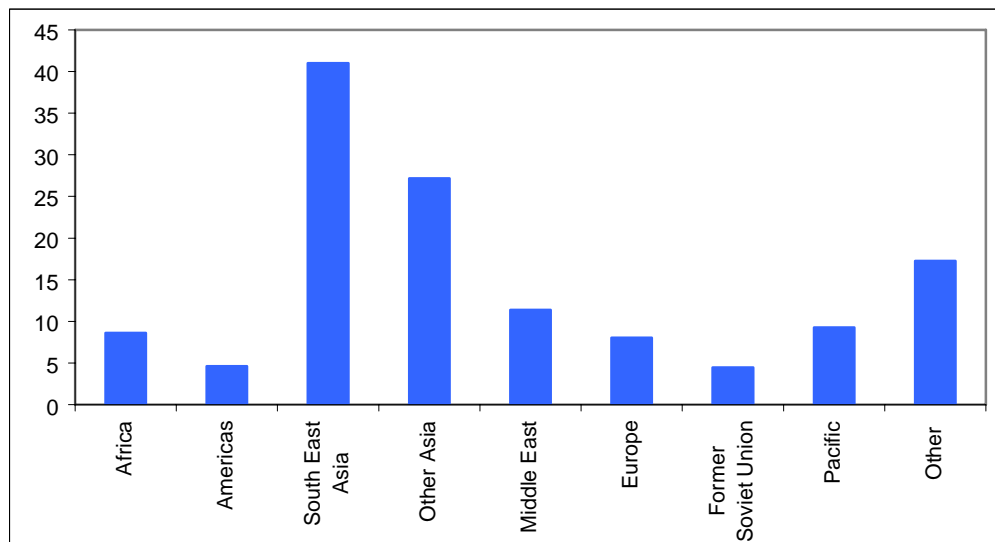


**Source: ADC, 1989- 2000, Dairy Compendium, ADC, Melbourne.**

Australia's dairy product exports consist of 50 per cent of annual milk production in fresh milk and in the milk equivalent of manufactured products. In recent years, increasing volumes of milk and short shelf-life products have been exported to the growing retail markets in Asia. Almost 70 per cent of milk exports are UHT. Hong Kong, Singapore and the Philippines market accounted for two-thirds of Australian fluid milk exports in 1999. Fluid milk exports increased by over 10 per cent in 1999 to 79,052 tonnes (Darby, 2000). This increase in exports reflects economic recovery in Asian markets and the lower value of the Australian currency.

Australia's dairy products, in particular cheese have been exported at substantially high volumes to Japan, which is the biggest cheese importer in Asia. Australia's cheese exports have been dominated by sales of cheddar cheese for processing, however in 2000-2001, there was strong growth in the sales of natural cheese for direct consumption such as cream cheese, mozzarella and shredding type cheeses (ADC, 2000-2002). Japan is also a significant importer of various dairy products such as cream cheese, SMP and other milk powders used in its food processing industry.

The Middle East, especially Saudi Arabia, has become a crucial market for processed varieties of cheddar cheese and butter/butter oil. Many countries in South East Asia have also imported high volumes of SMP and butter oil for recombination to produce fluid products and resell it in the domestic market. The Philippines, Taiwan, Malaysia and Thailand are the principal trade partners for Australia's exports of WMP (ADC, 1989-2000).

Table 4.5 shows that the aggregate Australian exports of WMP increased gradually from 26,846 tonnes in 1990 to 175,211 tonnes in 2001 in the world dairy market. Asian markets received the bulk of Australian exports, with the Philippines, Malaysia, Taiwan, and Hong Kong, absorbing over three fourth of total Australian WMP exports in 2001. These markets have steadily grown since 1993. Australia's WMP exports have substantially increased over recent years due to increased availability of manufacturing milk and the growth of international markets. Middle East and the Americas have been the second and third largest markets for Australia's WMP exports.

Table 4.6 exhibits that Australia's SMP exports worldwide increased to 200,803 tonnes in 2001 compared to 80,775 tonnes in 1990. The Asian market has also been a vital SMP importer from Australia. The Philippines ranks first with imports of 16,735 tonnes in 2001 followed by Malaysia, Japan and Singapore. More importantly, the Asian market has increased steadily the volumes of SMP imports form Australia since 1990. Australia's SMP exports have increased its substantial contribution to the dairy product sector over recent years. Other important SMP markets are the Americas as the second importer at 16,812 tonnes in 2001, followed by the Middle East, Africa, Pacific and Europe.

As shown in Table 4.7, the growth of Australia's butter exports has fluctuated since 1990 in the world dairy market. The Asian market is significant for Australia's butter exports similar to other dairy products such as WMP, SMP. However, Australian butter exports have more restricted access in several Asian countries compared to the other dairy products. Singapore is the largest Asian importer of butter, followed by Hong Kong,

Malaysia, and Taiwan. Africa has imported at high volumes since 1994, although its imports declined to 6,892 tonnes in 2001 from 13,496 tonnes in 2000. The Middle East, Europe, and Americas are also important markets for Australia's butter exports.

As presented in Table 4.8, the total exports of Australian cheese have increased steadily during 1990-2001. Cheese exports were from 26,006 tonnes in 1990 to 127,907 tonnes or around 4.9 times in 2001 in Asian market. It also reveals that Japan was the largest market for Australia's cheese exports, with steady increase from 47,656 tonnes in 1995 to 103,055 tonnes in 2001. Other Asian countries such as the Philippines, Indonesia, Hong Kong, and Taiwan were also significant importers of Australian cheese. The Middle East has been the second largest importer of Australian cheese with gradually increasing volumes since 1987, followed by Americas, Europe, Africa, and Pacific, respectively.

Table 4.9 shows that Australia's whey product exports have gradually expanded from 1994 to 2001 in the world dairy market. Whey products have more limited markets than other dairy products such as cheese, WMP and SMP in the world dairy market. The Asian market is the main market for Australia's whey and other dairy product exports. Among Asian countries, Indonesia has been at the first rank of whey products imports at 7,821 tonnes in 2001. The Philippines, Singapore, and Malaysia are also becoming the main markets in Asia for Australian whey product exports. Europe is the second ranked importer of Australian whey products behind Asia. The European imports have decreased from 1,734 tonnes in 1995 to 48 tonnes in 2001 and demonstrated substantial fluctuations over the period.

**Table 4.5: Australia's Exports of WMP (1990-2001)**

(tonnes)

| Year ended 30 June | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Asia** | | | | | | | | | | | | |
| Philippines | 1,426 | 928 | 2,038 | 2,260 | 12,212 | 18,565 | 17,843 | 20,517 | 25,031 | 27,415 | 25,146 | 23,637 |
| Singapore | 8,370 | 13,773 | 10,196 | 14,148 | 7,261 | 5,375 | 4,438 | 4,572 | 5,912 | 6,669 | 9,131 | 11,517 |
| Taiwan | 8,824 | 12,291 | 12,398 | 13,133 | 11,575 | 13,671 | 10,553 | 10,196 | 15,051 | 19,842 | 13,462 | 18,974 |
| Malaysia | 2,008 | 4,830 | 10,628 | 10,247 | 13,243 | 12,788 | 14,673 | 13,165 | 12,262 | 10,900 | 8,462 | 20,382 |
| Others | 2,272 | 3,286 | 3,435 | 14,224 | 15,609 | 23,010 | 29,698 | 29,446 | 5,510 | 15,751 | 22,647 | 40,779 |
| **Middle East** | 39 | 68 | 59 | 1,205 | 1,026 | 2,455 | 2,327 | 3,496 | 5,740 | 17,926 | 19,253 | 22,422 |
| **Africa** | 385 | 492 | 1,296 | 1,046 | 1,207 | 1,583 | 2,115 | 6,074 | 4,690 | 6,214 | 15,243 | 20,878 |
| **Pacific** | 2,207 | 1,907 | 2,023 | 2,065 | 2,879 | 2,418 | 2,511 | 3,009 | 2,923 | 4,459 | 4,133 | 4,572 |
| **Americas** | 1,293 | 1,289 | 2,058 | 3,300 | 6,179 | 9,342 | 2,158 | 10,474 | 8,308 | 2,985 | 11,180 | 11,433 |
| **Europe** | 0 | 18 | 2 | 176 | 138 | 243 | 219 | 216 | 5,153 | 1,034 | 2,693 | 617 |
| **Others** | 22 | 48 | 16 | 32 | 62 | 105 | 153 | 121 | 41 | 142 | 561 | 0 |
| **Total** | 26,846 | 38,930 | 44,149 | 61,836 | 71,391 | 89,555 | 86,688 | 101,286 | 90,621 | 113,337 | 131,911 | 175,211 |

**Source: ADC, 1989-2000, Dairy Compendium, ADC, Melbourne;**
**ADC, 2000-2002, Australian Dairy Industry: In Focus 2000-2002, ADC, Melbourne.**

**Table 4.6: Australia's Exports of SMP (1990-2001)**

(tonnes)

| Year ended 30 June | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Asia** | | | | | | | | | | | | |
| Japan | 11,806 | 29,078 | 32,160 | 14,460 | 22,278 | 26,304 | 17,871 | 23,768 | 26,517 | 29,272 | 18,636 | 18,465 |
| Philippines | 22,414 | 33,064 | 31,730 | 40,117 | 42,859 | 48,577 | 46,135 | 54,949 | 50,552 | 58,498 | 58,619 | 48,641 |
| Singapore | 9,116 | 8,418 | 859 | 12,352 | 12,763 | 16,951 | 12,320 | 17,668 | 11,379 | 13,728 | 14,3212 | 16,735 |
| Malaysia | 10,185 | 19,585 | 21,437 | 25,527 | 20,776 | 34,220 | 23,518 | 27,010 | 30,157 | 38,810 | 28,211 | 25,515 |
| Others | 5,590 | 13,913 | 14,064 | 18,963 | 20,686 | 61,043 | 56,368 | 69,553 | 69,169 | 90,797 | 91,379 | 79,153 |
| **Middle East** | 2,687 | 96 | 105 | 94 | 81 | 601 | 1,187 | 4,672 | 9,518 | 9,745 | 11,147 | 15,735 |
| **Africa** | 639 | 4,107 | 108 | 130 | 106 | 316 | 961 | 5,083 | 10,109 | 13,039 | 3,242 | 7,959 |
| **Pacific** | 1,100 | 169 | 201 | 744 | 812 | 761 | 1,091 | 819 | 720 | 1,524 | 568 | 1,025 |
| **Americas** | 16,964 | 1,190 | 1,194 | 1,998 | 35,015 | 16,897 | 15,763 | 13,164 | 12,753 | 13,695 | 19,044 | 16,812 |
| **Europe** | 120 | 51 | 52 | 31 | 572 | 771 | 362 | 131 | 836 | 4,487 | 1,057 | 600 |
| **Others** | 154 | 54 | 51 | 48 | 40 | 103 | 354 | 109 | 130 | 87 | 535 | 1 |
| **Total** | 80,775 | 109,725 | 101,961 | 114,464 | 155,988 | 167,973 | 138,472 | 179,754 | 185,812 | 228,439 | 329,955 | 200,803 |

Source: ADC, 1989-2000, Dairy Compendium, ADC, Melbourne;
        ADC, 2000-2002, Australian Dairy Industry: In Focus 2000-2002, ADC, Melbourne.

**Table 4.7: Australia's Exports of Butter (1990-2001)**

(tonnes)

| Year ended 30 June | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Asia** | | | | | | | | | | | | |
| Hong Kong | 1,853 | 2,286 | 2,843 | 2,973 | 3,183 | 3,501 | 2,679 | 2,451 | 2,937 | 3,513 | 3,263 | 2,781 |
| Singapore | 2,601 | 2,867 | 3,276 | 4,016 | 4,136 | 4,502 | 3,776 | 3,750 | 3,470 | 5,675 | 3,850 | 3,783 |
| Taiwan | 1,824 | 1,801 | 1,869 | 2,029 | 2,125 | 2,374 | 1,859 | 1,819 | 2,371 | 2,666 | 2,584 | 2,144 |
| Malaysia | 403 | 465 | 621 | 913 | 1,206 | 1,478 | 1,534 | 1,869 | 1,746 | 2,205 | 2,306 | 2,340 |
| Other | 1,892 | 5,715 | 6,656 | 1,109 | 1,739 | 1,753 | 1,800 | 2,294 | 2,010 | 2,537 | 2,723 | 2,218 |
| **Middle East** | 5,500 | 1,548 | 1,538 | 2,941 | 5,493 | 4,400 | 4,597 | 10,249 | 8,064 | 7,716 | 11,301 | 8,981 |
| **Africa** | 380 | 323 | 338 | 2,177 | 17,571 | 12,885 | 2,747 | 13,791 | 14,752 | 21,022 | 13,496 | 6,892 |
| **Pacific** | 1,878 | 872 | 552 | 483 | 490 | 417 | 154 | 1,034 | 592 | 990 | 855 | 379 |
| **Americas** | 87 | 0 | 842 | 447 | 786 | 1,497 | 68 | 1,699 | 4,028 | 2,379 | 3,400 | 2,277 |
| **Europe** | 12,004 | 13,251 | 2,440 | 16,154 | 6,140 | 2,583 | 3,144 | 11,652 | 7,304 | 16,111 | 9,834 | 7,804 |
| **Others** | 240 | 250 | 317 | 347 | 312 | 323 | 245 | 279 | 290 | 252 | 61 | 0 |
| **Total** | 28,662 | 29,378 | 21,292 | 33,589 | 43,181 | 35,713 | 22,603 | 50,887 | 47,564 | 65,066 | 53,673 | 39,599 |

**Source: ADC, 1989-2000, Dairy Compendium, ADC, Melbourne;**
**ADC, 2000-2002, Australian Dairy Industry: In Focus 2000-2002, ADC, Melbourne.**

**Table 4.8: Australia's Exports of Cheese (1990-2001)**

(tonnes)

| Year ended 30 June | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Asia** | | | | | | | | | | | | |
| Japan | 14,617 | 25,755 | 34,739 | 42,230 | 47,161 | 47,656 | 55,892 | 58,867 | 68,340 | 73,020 | 84,160 | 103,055 |
| Philippines | 5,679 | 4,659 | 4,193 | 3,977 | 4,827 | 5,842 | 6,017 | 5,509 | 6,767 | 5,934 | 5,916 | 5,186 |
| Hong Kong | 1,742 | 1,717 | 2,146 | 2,685 | 2,789 | 2,990 | 2,805 | 2,097 | 1,625 | 1,848 | 2,286 | 3,473 |
| Indonesia | 1,401 | 1,970 | 1,808 | 2,289 | 2,694 | 3,746 | 3,466 | 2,946 | 1,760 | 2,325 | 2,983 | 6,816 |
| Singapore | 1,229 | 1,074 | 1,378 | 1,811 | 1,663 | 1,627 | 1,382 | 1,381 | 1,563 | 2,040 | 2,656 | 2,279 |
| Others | 1,338 | 697.3 | 1,673 | 2,236 | 3,322 | 7,683 | 7,312 | 9,018 | 3,334 | 4,366 | 5,105 | 7,098 |
| **Middle East** | 13,892 | 12,980 | 9,257 | 13,776 | 14,588 | 15,397 | 18,274 | 14,974 | 19,761 | 24,369 | 25,228 | 26,606 |
| **Africa** | 780 | 942 | 1,066 | 1,212 | 1,473 | 2,783 | 1,786 | 3,606 | 8,219 | 14,686 | 7,991 | 9,000 |
| **Pacific** | 707 | 817 | 908 | 1,217 | 1,461 | 2,069 | 1,485 | 1,810 | 1,714 | 2,358 | 1,947 | 2,172 |
| **Americas** | 6,012 | 6,375 | 6,189 | 9,217 | 10,356 | 12,084 | 6,754 | 9,516 | 15,294 | 21,605 | 17,784 | 18,128 |
| **Europe** | 4,394 | 4,472 | 4,333 | 3,216 | 5,494 | 8,264 | 9,295 | 13,962 | 26,356 | 40,297 | 43,245 | 19,088 |
| **Others** | 42 | 49 | 58 | 62 | 120 | 125 | 1,082 | 75 | 63 | 103 | 0 | 0 |
| **Total** | 51,694 | 61,304 | 67,649 | 83,780 | 95,005 | 110,266 | 115,550 | 123,761 | 154,796 | 192,951 | 199,301 | 202,901 |

Source: ADC, 1989-2000, Dairy Compendium, ADC, Melbourne;

ADC, 2000-2002, Australian Dairy Industry: In Focus 2000-2002, ADC, Melbourne.

**Table 4.9: Australia's Exports of Whey Products (1990-2001)**

(tonnes)

| Year ended 30 June | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Asia** | | | | | | | | | | | | |
| Philippines | 1,735 | 1,326 | 3,877 | 3,545 | 2,446 | 5,509 | 3,877 | 3,906 | 5,100 | 6,980 | 6,671 | 6,280 |
| Hong Kong | 151 | 1,385 | 753 | 449 | 1,401 | 2,858 | 3,650 | 3,640 | 3,570 | 1,568 | 1,549 | 2,810 |
| Indonesia | 954 | 1,173 | 2,659 | 3,193 | 4,843 | 4,140 | 5,335 | 6,598 | 5,425 | 5,631 | 6,159 | 7,821 |
| Singapore | 642 | 607 | 1,535 | 2,296 | 1,072 | 1,596 | 2,099 | 3,337 | 2,801 | 2,826 | 2,098 | 5,551 |
| Malaysia | 1,568 | 1,850 | 1,876 | 2,920 | 3,515 | 5,760 | 5,728 | 6,958 | 6,758 | 6,914 | 4,347 | 3,337 |
| Others | na | 9,786 | 18,064 | 15,412 | 7,523 | 2,176 | 4,188 | 3,587 | 3,388 | 2,917 | 1,986 | 1,060 |
| **Europe** | na | na | na | 48 | 12 | 1,734 | 1,561 | 408 | 2,162 | 213 | 201 | 48 |
| **Others** | 9,649 | 9,839 | 15,856 | 14,020 | 7,157 | 1,960 | 2,586 | 2,107 | 6,781 | 5,408 | 4,439 | 5,166 |
| **Total** | na | na | na | 41,883 | 27,969 | 25,733 | 29,024 | 30,541 | 35,985 | 32,457 | 27,450 | 32,073 |

**Source: ADC, 1989-2000, Dairy Compendium, ADC, Melbourne;**
   **ADC, 2000-2002, Australian Dairy Industry: In Focus 2000-2002, ADC, Melbourne**

## 4.4 Australia's Exports of Dairy Products to Thailand


## 4.4.1 Economic Relationships and FTA Between Australia and Thailand

Australia and Thailand have a close relationship in bilateral trade. The strong and potential cooperation of bilateral trade is beneficial for both countries in a number of traded commodities such as automobiles, processed food, textiles and clothing. Both countries have also cooperated through WTO, the Cairns group, and in particular, Asia Pacific Economic Cooperation (APEC). Under APEC negotiations, Australia and Thailand have committed to and focused on, trade liberalisation and reform as a high priority. Both nations also have negotiated trade agreement towards a Close Economic Relations Free Trade Agreement (CER-FTA) since 2002. The agreement has focused on a comprehensive liberalisation of trade in goods and services sectors as well as investment. In 2003, Prime Ministers Howard (Australia) and Chinnawat (Thailand) announced the negotiations on the Australia-Thailand free trade agreement (FTA). Both nations have expected greater trade liberalisation from each other under FTA framework. The FTA was signed in the mid 2004, with implementation from January 2005 (Australian Financial Review,2004; Thai News Service, 2004).

Australia and Thailand will have important opportunities for each other through many industry sectors under the comprehensive Free Trade Agreement (FTA). For example, both countries could gain more benefits from new trade flows, based on each country's specialization of its products of comparative advantage. The two countries share in a vision on major trade issues. Australia and Thailand have cooperated under the WTO framework, APEC and the AFTA-CER arrangements that relate to Australia, New Zealand and ASEAN economies. The FTA would create greater improvement in trade flows of goods and services between Australia and Thailand. The FTA could, for both countries, build stronger national economies in many sectors such as agriculture, minerals, and services. This would limit the adjustment costs in the sectors concerned. The FTA would also push the two countries to secure more benefits in some trade divisions, while reducing economic costs.

Australia would have open access to the larger Thai market where there are 62.19 million population (the United Nations, 2003). Thailand's import tariffs will also be reduced to 30-50 per cent for several products such as steel, pharmaceutical products, fruits and vegetables, beer and wine (DFTA, 2003a). Additionally, Thailand's import quotas will be increased for Australia's processed food, including dairy products. Australia will also have priority over other exporting countries. Based on the FTA, trade facilitation will reduce the costs of production for Australian exporters.

On the other hand, Thailand will be able to enjoy the growth of investment and competitiveness from a more open services sector. The FTA is focused on the benefits of greater and faster trade liberalization, even after taking into account the adjustment costs. Consequently, trade liberalisation would generate a gain for Thailand of US$10 billion compared with the alternative of liberalization over 5 years for Australia and 10 years for Thailand. The FTA would increase Australia's GDP by A$12 billion and Thailand's GDP by A$46 billion over a 20 year period (DFAT, 2004). Australia's trade with Thailand will increase substantially in products such as dairy and other agricultural products, pharmaceutical goods, aluminium, beer and wine. Hence, Australian firms could earn greater profit from the FTA, in particular banking and professional services by being able to trade in their services more freely in the Thai market.

Based on the FTA, Thailand will eliminate its tariffs on some 2,934 items, around 53 per cent of all items, accounting for 78 per cent of current Thai imports from Australia. Only 206 items are currently duty free. A further 41 per cent of Thai tariffs will be phased out to zero by 2010. These items cover 17 per cent of current trade. All remaining tariffs, including tariff rate quotas, will be phased out to zero in 2015 or 2020, with the exception of SMP and liquid milk and cream, for which the tariff rate quotas will be eliminated in 2025. For agricultural products currently subject to tariff rate quotas, Thailand will either eliminate the tariff and quotas restrictions or expand access for Australia over a transition period varying according to the product, before final elimination of the tariff rate quota (DFAT, 2004). In particular, Thailand's tariffs on imports of dairy products from Australia will be reduced from 32 to 0 per cent, and be phased out by 2010 or 2020.

Thailand's import quotas for Australian milk powders, and milk and cream, will also be expanded by 2025 (Davis, 2003). Furthermore, Thailand will eliminate the current import tariffs on infant formula by 5 per cent, lactose up to 20 per cent, casein and milk albumin by 10 per cent, and phased out import tariffs on butterfat, milk food, yoghurt, dairy spreads and ice cream to 0 per cent in 2010. Thailand will provide to increased import quotas for Australia of 2,200 tonnes for SMP and 120 tonnes for liquid milk and cream, expanding by 17 per cent at five yearly intervals until 2025, when all tariffs and quotas will be eliminated. Thailand will phase out the tariffs for butter and cheese, other milk powders and concentrated milk to 0 per cent in 2020 (DFAT, 2004).

As shown in Table 4.10, Australia and Thailand are separated by differences in economic development indicators. Thailand's per capita income is lower than one-fourth of Australia's in purchasing power parity (PPP) and around 9.81 per cent in current dollar terms. These differences influence significantly to the uneven levels in capital per worker. However, Thailand, the large food supplier in South East Asia, has exported and imported more than 23.24 and 19.30 times of Australia in the world market.

**Table 4.10: The Australian and Thai Economies, A Comparison**

|  | **Australia** | **Thailand** |
|---|---|---|
| Population (million, 2002) | 19.95 | 62.19 |
| Surface Area ('000s square km) | 7,741 | 513 |
| GDP (US$billion, 2000, current prices) | 395 | 122 |
| GNP-PPP (US$billion, 1999) | 426.4 | 345.4 |
| GDP Growth (annual average, %) |  |  |
| 1980-1995 | 3.1 | 8.1 |
| 1995-2000 | 4.1 | 0.4 |
| Exports of goods and services (US$billion, 2002) | 151.29 | 3,516.9 |
| Imports of goods and services (US$billion, 2002) | 161.95 | 3,123.6 |
| Per capita GDP (US$/person, 2000, current prices) | 19,906 | 1,954 |
| Per capita GNP-PPP (US$/person, 1999) | 22,448 | 5,599 |

**Source: DFAT (2003a); International Financial Statistics, IMF (1975-2000).**

Table 4.11 and Figure 4.4 exhibit bilateral trade between Australia and Thailand during 1981-2002. Australia's exports of goods and services to Thailand have begun to decrease rapidly as a result of the Thailand's economic crisis and slow growth of Thailand's imports since 1997. In general, the growth of trade between the two countries was due to both Thailand's increasing role as a supplier of manufactured products to the global markets and increasing average income in Thailand. However, the Asian financial crisis impacted deeply on Thailand's economic slowdown. Australia's exports to Thailand declined mainly because Thai economy contracted and its exchange rate depreciated. Australia's exports of goods and services to Thailand decreased 25 per cent and 33 per cent, respectively between 1995-1998 (DFAT, 2003b). Even though Australia's exports of goods and services have started to return to good performance and expand strongly in the Thai market since 1999, Australia still has trade deficit with Thailand.

**Table 4.11: Bilateral Trade between Australia and Thailand (1981-2002)**

(A$ million)

| Year | Australia's Total Exports to Thailand | Australia's Total Imports from Thailand | Australia's Trade Balance |
|---|---|---|---|
| 1981-1982 | 133 | 72 | 61 |
| 1984-1985 | 200 | 156 | 44 |
| 1989-1990 | 591 | 479 | 112 |
| 1990-1991 | 665 | 505 | 160 |
| 1991-1992 | 816 | 647 | 169 |
| 1992-1993 | 1,205 | 756 | 449 |
| 1993-1994 | 1,278 | 794 | 484 |
| 1994-1995 | 1,560 | 970 | 590 |
| 1995-1996 | 1,779 | 1,005 | 774 |
| 1996-1997 | 1,693 | 1,201 | 492 |
| 1997-1998 | 1,390 | 1,480 | -90 |
| 1998-1999 | 1,306 | 1,902 | -596 |
| 1999-2000 | 1,703 | 2,422 | -719 |
| 2000-2001 | 2,222 | 2,780 | -558 |
| 2001-2002 | 2,291 | 2,886 | -595 |

**Source: ABS, 1983-2002, International Trade, Catalogue No. 5422.00.**

**Figure 4.4: Bilateral Trade between Australia and Thailand (1981-2002)**

However, bilateral trade between the two nations is strong in expectation of the size of their import markets. In the Thai market, Australia's share of exports, approximately 1.9 per cent, is behind Japan by 18.84 per cent, the EU by 12.09 per cent and the USA by 9.56 percent in 2002 (the Department of Customs, 2002). These also impact on further expansion of bilateral trade between Australia and Thailand. Australia also exports manufacturing products to Thailand. In 1996, manufacturing products consisted more than half of merchandise exports while over a quarter was primary products. Manufactures exports also decreased during Thailand's economic crisis. However, manufactures share of merchandise exports recovered with improved economic conditions in Thailand, at over A$844 million or 43 per cent of merchandise exports in 2000 (DFAT, 2003b).

Although Australia-Thailand bilateral trade is meaningful, it is below the levels achieved with some comparable East Asian economies. In particular, investment links between the two economies are quite limited. There is potential for much closer cooperation between Australian and Thai companies in specific sectors such as automobiles, processed food (including the dairy sector), and textiles and clothing (DFAT, 2003b). Bilateral trade

leads the scope for development of both economic areas such as electronic commerce that would be increased over the next decade.

The export sector of Thailand helped ease the severity of economic contraction, with export volumes expanding at a rate of 8.1 per cent in 1998. Export volumes of agricultural products, such as rice, rubber and frozen fowl, and high tech manufacturing products such as electronics and automobile parts increased substantially. Nevertheless, in value terms exports decreased by 6.8 per cent from 1997 as a result of declining export prices caused by intense price competition. Imports declined sharply across the board with a total year on year reduction of 33.8 per cent. The surplus of services and transfers increased by 35.9 per cent, due in part to a substantial reduction in Thais travelling overseas (DFAT, 2004).

In primary products, Australia's exports to Thailand were not affected much by the financial crisis during 1997-1998. For example, an increasing value was in cotton by A$173 million, fish by A$18.3 million, food and live animals by A$10.6 million and dairy products by 89.7 million, respectively in 1998 (see Table 4.12). Australian exports of crude petroleum fluctuated substantially during 1996-1999, but returned to high value again at A$160.9 million in 2000. Additionally, Australia's minerals such as aluminium and other ores have performed relatively well, with an average value of exports of A$229.22 million and A$57.91 million, respectively during 1996-2001.

In 2001, Australia's exports of agricultural products to Thailand were valued at A$524 million and accounted for 42.48 per cent of total exports. Australia's exports of specific products are presented in Table 4.12. Australia's manufacturing exports have performed strongly in the Thai market in the past six years for instance, copper, medicaments, the milling industry, and telecommunication. Cotton was the largest export to Thailand, growing at an average annual rate of 11.87 per cent among 2000-2001. Australia's dairy products have fluctuated substantially at approximately A$100 million during 1996-2001. Cereal preparations, food & live animals, vegetables and fruits and raw hides and skins exports have also grown in the Thai market. Crude petroleum is Australia's largest

mineral export to Thailand, but exported values have fluctuated in recent years. Exports of other ores, including lead, zinc, tin ores, have increased by 14.7 per cent in 1996.

**Table 4.12: Australia's Exports to Thailand (1996-2001)**

A$ million

| Product | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|---|
| Cotton | 74.7 | 96.1 | 173.0 | 188.4 | 221.5 | 247.8 |
| Fish | 5.4 | 6.5 | 8.3 | 6.3 | 6.6 | 40.0 |
| **Dairy Products** | **113.5** | **85.5** | **89.7** | **80.7** | **75.0** | **82.1** |
| Prepared animal fodder | 6.0 | 4.4 | 2.6 | 4.5 | 4.3 | 5.6 |
| Food & Live Animals | na | 18.2 | 15.6 | 17.5 | 18.5 | 24.5 |
| Cereal Preparations | 10.5 | 9.4 | 20.8 | 21.0 | 26.0 | 44.9 |
| Raw Hides and Skins | 6.8 | 4.5 | 10.6 | 8.2 | 10.4 | 20.3 |
| Vegetables and Fruit | na | 14.1 | 8.6 | 9.5 | 15.2 | 17.2 |
| Aluminium | 238.7 | 196.7 | 168.6 | 152.2 | 242.2 | 377.2 |
| Copper | 38.4 | 38.2 | 7.4 | 31.1 | 73.4 | 106.0 |
| Crude Petroleum | 43.7 | 147.2 | 6.9 | 26.0 | 160.9 | 150.8 |
| Other Ores | 44.3 | 40.4 | 38.8 | 63.5 | 85.1 | 75.4 |
| Medicaments | 29.7 | 37.0 | 27.6 | 42.6 | 64.4 | 107.2 |
| Products of the milling industry | 12.0 | 10.6 | 18.8 | 19.8 | 20.3 | 30.9 |
| Telecommunications Equipment | 7.7 | 12.2 | 7.8 | 13.3 | 47.3 | 33.3 |
| Pigments, Paints, Varnishes | 23.7 | 24.7 | 16.2 | 25.7 | 36.4 | 36.7 |
| Passenger Motor Vehicles | 31.4 | 14.6 | 1.6 | 28.7 | 32.7 | 26.1 |
| Electricity Distribution Equipment | 24.7 | 21.9 | 7.9 | 0.7 | 1.7 | 13.8 |
| Electrical Equipment for Circuits | 8.5 | 9.1 | 3.2 | 2.5 | 5.8 | 13.3 |
| **Total Exports** | **na** | **696.8** | **462.5** | **555.4** | **1,157.2** | **1,233.4** |

**Source: DFAT (2003b).**

## 4.4.2 Australia's Exports of Dairy Products to Thailand

As mentioned in Sections 2.4 (Thailand's consumption of milk products) and 2.5 (Thailand's milk production) in Chapter 2, Thailand's domestic supply of dairy products is insufficient to meet the demand. Its domestic production of raw milk was only 30 per cent of the total market requirement in 1997 (AUSTRADE, 1998). Moreover, an average consumption was around 2 litres per person in 1990. Based on the promotion in some projects such as 'school milk program', Thailand's domestic consumption of milk is expected to increase 20-25 tiers per person by the year 2007 (BOI, 2003b).

In terms of Thailand's dairy product imports, the main suppliers were New Zealand by 24.2 per cent, Australia by 22.7 per cent, the Netherlands by 9 per cent, and from Switzerland, Japan, and China in 1998 (AUSTRADE, 1998). There are five major dairy products of Australia's exports to Thailand: SMP, WMP, butter, cheese and whey products. The aggregate exports of Australia's dairy products to Thailand have increased substantially during 1990-2001 (see Table 4.13). Nevertheless, the average rate of exports declined by 19.69 per cent due to the effects of the financial crisis during 1997-1998. The three principal categories are SMP, butter and WMP used for Thailand's domestic milk processing industry. SMP is the largest dairy product export to Thailand. Butter and butter fat followed as the second item with high volume of exports at 16.93 per cent or 7,200 tonnes in 2001. The exports of WMP increased gradually from 4.72 per cent in 1990 to 22.64 per cent in 2001. Cheese and whey products were in small proportion of the total exports because Thailand's dairy industry has improved slowly in these sectors. Therefore, Australia's dairy exports to Thailand will expand in the future, but Australia might face stiff competition in the Thai market from New Zealand and the EU.

**Table 4.13: Australia's Dairy Product Exports to Thailand (1990-2001)**

(tonnes)

| Year ended 30 June | WMP | | SMP | | Butter and Butter Fat | | Cheese | | Whey Products | | Total Exports of Dairy Products | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Volume | % of Total Dairy Product Exports | Volume | % of Total Dairy Product Exports | Volume | % of Total Dairy Product Exports | Volume | % of Total Dairy Product Exports | Volume | % of Total Dairy Product Exports | Volume | Percent-age |
| 1990 | 1,035 | 4.72 | 15,612 | 71.23 | 4,700 | 21.44 | 422 | 1.92 | 149 | 0.68 | 21,918 | 100 |
| 1991 | 756 | 3.45 | 14,462 | 66.08 | 6,000 | 27.41 | 420 | 0.19 | 247 | 1.12 | 21,885 | 100 |
| 1992 | 1,831 | 7.97 | 10,975 | 47.80 | 9,500 | 41.38 | 309 | 1.34 | 342 | 1.49 | 22,957 | 100 |
| 1993 | 1,668 | 7.31 | 15,568 | 68.28 | 10,100 | 44.30 | 379 | 1.66 | 83 | 0.36 | 22,798 | 100 |
| 1994 | 2,641 | 8.42 | 18,774 | 59.85 | 9,500 | 30.28 | 368 | 1.17 | 84 | 0.26 | 31,367 | 100 |
| 1995 | 3,016 | 8.18 | 19,180 | 52.05 | 12,800 | 34.74 | 473 | 1.28 | 1,374 | 3.73 | 36,843 | 100 |
| 1996 | 6,066 | 12.81 | 26,370 | 55.68 | 12,600 | 26.60 | 586 | 1.23 | 1,731 | 3.65 | 47,353 | 100 |
| 1997 | 7,913 | 19.48 | 21,634 | 53.26 | 9,200 | 22.64 | 635 | 1.56 | 1,239 | 3.05 | 40,621 | 100 |
| 1998 | 8,209 | 23.17 | 15,938 | 45.00 | 8,500 | 24.00 | 766 | 2.16 | 2,016 | 5.70 | 35,429 | 100 |
| 1999 | 10,743 | 22.40 | 26,746 | 55.75 | 7,600 | 15.84 | 1,266 | 2.64 | 1,613 | 3.36 | 47,968 | 100 |
| 2000 | 11,573 | 23.27 | 24,256 | 48.79 | 10,100 | 20.31 | 775 | 1.55 | 1,211 | 2.43 | 49,715 | 100 |
| 2001 | 9,633 | 22.64 | 23,623 | 55.54 | 7,200 | 16.93 | 1,069 | 2.51 | 1,007 | 2.36 | 42,532 | 100 |

**Source: ADC (1990-2000); ADC, in Focus (2000-2002); The Department of Customs (1987-1994); ABARE (1995-2001).**

**4.5 Conclusion**

Australia's exports of dairy products to Asia are supported by two main advantage factors: favourable geographical location and low cost of transportation. This also includes the numbers of dairy cows, which influences consistently to the growth of production. Australia's dairy production increased substantially at an average of 51.74 per cent between 1990-2000. Australia's exports of dairy products have also grown 62.13 per cent over the same period.

Exports of Australia's dairy products are worldwide, to Asia-Pacific, Middle East, Africa, Former Soviet, and the Americas. During 1980-2001, Australia's milk dry, including SMP has the main proportion of exports at 52.75 per cent, followed by cheese and butter at 29.38 and 13.87 per cent, respectively. Milk condensed and evaporated and whey products are at low level of total exports in the world dairy market. Additionally, Australia's dairy product exports to South East Asia and other Asian countries were in high proportion of the aggregate exports, accounted for 41.12 and 27.15 per cent, respectively in 1998. Japan, The Philippines, Malaysia, Singapore, Taiwan and Thailand are the principal importers of Australia's dairy products and their imports are more than 50 per cent of Australia's total exports. However, Australia is still behind the EU and New Zealand (the biggest dairy exporter). There are also five main dairy products of Australia's exports to Thailand: WMP, SMP, cheese, butter and whey products. The aggregate exports of Australia's dairy products rose steady in the Thai market during 1990-2001.

Australia and Thailand have a good relationship in bilateral trade, and both countries also have a strong and potential cooperation of bilateral trade. The two countries have been members of WTO, the Cairns group, and Asia Pacific Economic Cooperation (APEC). Australia and Thailand have committed to and focused on trade liberalization and reform as a high priority under the APEC framework. The expansion of trade and investment of both countries are also in the APEC agreement. Thailand has been one of Australia's most significant trading partners over the past two decades. In 2003, both countries announced the negotiations on the Australia-Thailand FTA. Both countries have

committed more trade liberalization from each other. As regards the benefits of the FTA, Australia could have open access to the Thai market where there is around 62.90 million population. In addition, import tariffs of Thailand will be reduced to 0 to 50 per cent for many products. Thailand's import quotas will be increased for many products, including dairy products. It is estimated that the FTA will result in Australia's GDP grow around A$12 billion over a twenty year period.

Chapter 5 will examine the trade performance of Australia's dairy products and analyse the degree of Australia's comparative advantage and competitiveness in dairy products, relative to other dairy products exporting countries. To this end, trade specialization index, export propensity index, import penetration index and export/import ratio are used as indicators of Australia's comparative advantage in dairy products. Then, Balassa's index is utilised to analyse Australia's revealed comparative advantage in dairy products. To examine the extent to which Australia's dairy products have been competitive in the world market, Vollrath's competitive advantage indexes will be used.

# Chapter 5

# Comparative Advantage in Dairy Products: Australia, Thailand and other Selected Countries

## 5.1 Introduction

Australia is a country well endowed with natural resources and also a net-exporter of agricultural and mineral products. These include dairy products, which is one of the main processed food industries, contributing significantly to Australia's national economy. Thus, products such as cheese, butter, wool and coal have been the dominant merchandise exports on which Australia had focused heavily for many decades in the past. Manufactures and services exports now surpass primary commodity exports. The discussion in Chapter 4 was on Australia's dairy product exports to Thailand. Australia's dairy exports are behind New Zealand and the European Union (the EU) in the Thai market. Therefore, it is important to analyse and compare Australia's competitiveness with New Zealand and some dairy exporting countries in the EU.

The objectives of this Chapter are to examine the trade performance of Australia's dairy products and to analyse the comparative advantage of Australian dairy products, compared to Thailand and several other exporting countries. Trade specialisation index (TSI), export propensity index (EPI), import penetration index (MPI) and export/import ratio (EIR) are utilised as indicators of trade performance and comparative advantage in dairy products. Balassa's index is used to analyse revealed comparative advantage in dairy products. The competitiveness of the countries in dairy products in the world market is analysed using Vollrath's revealed competitive advantage indexes.

The structure of this Chapter is as follow: Section 5.2 reviews the theory of absolute advantage. Section 5.3 reviews the theory of comparative advantage. Section 5.4 derives and examines some empirical indicators of trade performance and comparative advantage in dairy products. The analysis of revealed comparative advantage using Balassa's index of revealed comparative advantage (RCA) is presented in Section 5.5. The analysis using

Vollrath's competitiveness indexes is provided in Section 5.6. Concluding remarks are included in Section 5.7.

## 5.2 Theory of Absolute Advantage

Adam Smith (1776) explained the basis of international trade in terms of absolute advantage. Smith pointed out the trade pattern based on absolute advantage of production where one nation is more efficient (has an absolute advantage over), than another in the production of one commodity, but is less efficient than (has an absolute disadvantage) the other nation in producing a second commodity. For example, nation X is more efficient or has absolute advantage over, nation Y in the production of commodity A. Whereas nation Y is more efficient than, or has as absolute advantage over, nation X in the production of commodity B. Each nation could gain by each specialising in the production of the commodity of it absolute advantage and then exchange part of its output with the other nation for the commodity of its absolute disadvantage. However, absolute advantage can explain only a small part of world trade. For example, trade in agriculture and manufactured products between developing and developed nations. Absolute advantage cannot explain the trade pattern where one of the two nations has absolute advantage in both commodities.

## 5.3 Theory of Comparative Advantage

### 5.3.1 Ricardo's Theory

In 1817, David Ricardo's Principles of Political Economy and Taxation developed the principal of comparative advantage. It became the most fundamental concept of international trade theory. Even if one nation is less efficient than (has an absolute disadvantage) the other nation in the production of both commodities, there is still a basis for mutually beneficial trade. Nation Y should specialise in the production and export of the commodity in which it has comparative advantage and import the commodity for which it has comparative disadvantage.

The law of comparative advantage is based on the assumption that each producer is too small relative to the market size to control the price of each commodity it produces. This causes the price of each commodity to be equal to its marginal cost of production. The output increases in the same proportion as the increase in all inputs used in production that is, constant returns to scale. Therefore, the theory of comparative advantage is built upon the differences in relative commodity prices between two nations, under constant returns to scale and perfect competition (Bhagwati, 1964; Dunn and Mutti 2000).

Haberler (1936) illustrated Ricardo's theory of comparative advantage in terms of opportunity costs or relative prices. Opportunity cost of producing commodity X is the number of units of commodity Y that must be given up in order to produce one more unit of commodity X. Hence, in a two nation world, the nation with the lower opportunity cost in the production of commodity X has a comparative advantage in X and specializes in the production of commodity X. That nation will export some of its output of X in exchange for the commodity Y for which the other nation has lower opportunity cost of production, and therefore comparative advantage.

## 5.3.2 Heckscher-Ohlin (H-O) Theory

In 1919, Eli Heckscher published the substance of H-O theory on comparative advantage. Bertil Ohlin developed the theory further in 1933. The H-O theory assumes similar production technology, similar factor intensities in products and similar consumer tastes and preferences across nations. Further, the theory assumes constant returns to scale in production, incomplete specialisation in production, perfectly competitive product and factor markets, perfect factor mobility within nations but no factor mobility between nations, no transport costs or other barriers to trade, full employment of resources within nations and balanced international trade. H-O theory of international trade concludes that a nation will export the commodity whose production requires the intensive use of the nation's relatively abundant and cheaper factor. A nation will import the commodity whose production requires the intensive use of the nation's relatively scarce and expensive factor. The capital abundant nation would export the relatively capital (K) intensive commodity and imports the relatively labour (L) intensive commodity. For

instance, nation X exports commodity A because commodity A is the K-intensive commodity and K is the relatively abundant and cheap factor in Nation X. In contrast, nation Y would export commodity B because commodity B is the L-intensive commodity and L is the relatively abundant and cheaper factor in Nation Y.

Wassily Leontief (1956) examined the H-O model in 1951 using the U.S data for the year 1947. As the U.S was a capital (K)-abundant nation, he hypothesized that the U.S exported K-intensive commodities and imported L-intensive commodities. Leontief used the input-output table of the U.S economy to calculate the amount of labour and capital in a representative bundle of one million worth of U.S exports and imports-substitutes for the year 1947. He also estimated capital/labour (K/L) ratios for the U.S. import substitutes rather than for imports. Import substitutes are commodities, such as automobiles, that the U.S. produces at home but also imports from overseas due to non-specialisation. He used the U.S data on import substitutes because foreign production data on actual U.S imports were not available. The results showed that the U.S import-substitutes would be more K-intensive than actual imports because the U.S had relatively cheaper capital than overseas. Leontief found that the U.S. import substitutes were about 30 per cent more K- intensive than U.S exports, and concluded that the U.S exports L-intensive commodities and imports K-intensive commodities. Therefore, Leontief disagreed with the H-O theory and this disagreement is known as the Leontief paradox.

There were many other empirical studies after Leontief, including Kravis (1956), Kenen (1965), Keesing (1966) and Baldwin (1971) who gave explanations of the Leontief paradox based on human capital[1] that Leontief did not consider. In contrast, other empirical studies found conflicting results to that of Leontief and supported the H-O model. These studies include for example Leamer (1980), Bowen, Leamer and Sveikaukas (1987), Brecher and Choudhri (1993), James and Elmslie (1996).

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1. Human capital refers to the education, job training, and health embodied in workers that increase productivity.

## 5.4 Some Empirical Indicators of Australia's and Thailand's Comparative Advantage in Dairy Products[2]

### 5.4.1 Trade Specialisation Index (TSI)

An empirical indication of a country's comparative advantage can be obtained by calculating Balassa's trade specialization index (Balassa, 1966). This indicator is derived by the ratio of net sectoral trade over the total of sectoral exports and imports. The trade specialisation index ($TSI_{ad}$) is as follows:

$$TSI_{ad} = (X_{ad} - M_{ad}) / (X_{ad} + M_{ad}) \tag{5.1}$$

Where;

$X_{ad}$ = exports of dairy product $d$ by country $a$;

$M_{ad}$ = imports of dairy product $d$ by country $a$.

Trade specialisation index ($TSI_{ad}$) would have a value between minus one and plus one. If $TSI_{ad}$ value is positive, country $a$ specialises in the production of dairy product $d$, and is a net-exporter of that product. Hence, country $a$ has comparative advantage in the trade of dairy product $d$. In contrast, if $TSI_{ad}$ value is negative, country $a$ has a comparative disadvantage in the trade of dairy product $d$, and is a net-importer of that product.

Tables 5.1 and 5.2 present calculated trade specialisation indexes (TSI) for dairy products of Australia and Thailand. For Australia, TSI values for the dairy products are positive, indicating that Australia is a net-exporter based on comparative advantage. On the other hand, for four of the dairy products (milk dry, cheese, butter and whey preserved and concentrated) of Thailand, TSI values are negative indicating that Thailand is a net-importer and has a trade deficit in these products. However for milk condensed and evaporated, Thailand has positive TSI values indicating that it is a net-exporter of these products.

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2. The data series used to derive indicators presented in this section are given in Appendix 5.1.

**Table 5.1: Australia's Trade Specialisation Index (TSI) for Dairy Products, 1990-2001**

| Product | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Milk Condensed and Evaporated | 0.70 | 0.85 | 0.79 | 0.82 | 0.83 | 0.84 | 0.89 | 0.87 | 0.89 | 0.95 | 0.91 | 0.94 |
| Milk Dry | 0.97 | 0.97 | 0.95 | 0.94 | 0.97 | 0.97 | 0.97 | 0.97 | 0.96 | 0.95 | 0.96 | 0.96 |
| Whey Preserved and Concentrated | 0.47 | 0.48 | 0.49 | 0.49 | 0.48 | 0.48 | 0.48 | 0.48 | 0.48 | 0.48 | 0.48 | 0.49 |
| Butter | 0.96 | 0.96 | 0.93 | 0.95 | 0.95 | 0.93 | 0.88 | 0.93 | 0.91 | 0.89 | 0.83 | 0.81 |
| Cheese and Curd | 0.46 | 0.48 | 0.47 | 0.54 | 0.59 | 0.61 | 0.60 | 0.66 | 0.73 | 0.70 | 0.71 | 0.63 |

**Source: Estimated complied using data from FAO Trade Yearbook, Various Issues, (1980-2001).**


**Table 5.2: Thailand's Trade Specialisation Index (TSI) for Milk Condensed and Evaporated, 1990-2001**

| Product | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Milk Condensed and Evaporated | 0.48 | 0.49 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.47 | 0.48 | 0.48 | 0.46 | 0.49 |
| Milk Dry | -0.94 | -0.89 | -0.95 | -0.92 | -0.87 | -0.96 | -0.96 | -0.96 | -0.94 | -0.94 | -0.95 | -0.94 |
| Whey Preserved and Concentrated | -0.29 | -0.83 | -0.91 | -0.88 | -0.92 | -0.94 | -0.95 | -0.91 | -0.94 | -0.94 | -0.88 | -0.91 |
| Butter | na | -0.99 | -1.00 | -1.00 | na | -1.00 | -1.00 | -1.00 | -1.00 | -0.99 | -0.99 | -1.00 |
| Cheese and Curd | -1.00 | -1.00 | -1.00 | -0.99 | -0.99 | -0.57 | -0.99 | -0.86 | -0.94 | -0.82 | -0.96 | -0.98 |

na is not available.
**Source: Estimated complied using data from FAO Trade Yearbook, Various Issues, (1980-2001).**

## 5.4.2 Export Propensity Index (EPI)

The export propensity index (EPI$_{ad}$) for dairy products is defined as the percentage ratio of the exports of dairy products divided by total domestic production of dairy products:

$$\text{EPI}_{ad} = (\text{X}_{ad} / \text{DP}_{ad}) \times 100 \tag{5.2}$$

Where;

   X$_{ad}$ = exports of dairy product $d$ by country $a$;

 DP$_{ad}$ = total domestic production of dairy product $d$ by country $a$.

If country $a$ has a higher ratio of export propensity (EPI$_{ad}$), it indicates that country $a$ has comparative advantage and specialises in that industry.

Table 5.3 displays export propensity (EPI$_{ad}$) of Australia's dairy industry. All of the dairy products of Australia have higher ratios of EIP and they indicate that Australia has a comparative advantage in the dairy industry. Australia's milk dry has the highest percentage of EIP with the peak at 96.44 per cent in 1998. Following milk dry, whey preserved and concentrated, butter, cheese and curd were at 64.51, 63.16, and 54.87 per cent, respectively in 2001, although the EPI has fluctuated over the period 1990-2001. Milk condensed and evaporated has the lowest rank of EPI during 1990-2001. As shown in Table 5.4, Thailand's EIP for milk condensed and evaporated[2] was at the peak of 362.3 per cent in 2001. This is the only dairy product sector in which Thailand appears to have a comparative advantage. Thailand also exports milk condensed and evaporated to neighbours such as Malaysia, Vietnam, Laos and Singapore. The calculated EPI for dairy products of Australia and Thailand indicate that Australia can continue to export all of the dairy products to Thailand, except milk condensed and evaporated.

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[2] It should be noted that, since Thailand does not produce milk dry, whey products, butter and cheese and curd, the EPI or MPI for these four dairy products could not be calculated.

**Table 5.3: Australia's Export Propensity in Dairy Products, 1990-2001**

| Product | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Milk Condensed and Evaporated | 2.78 | 3.21 | 3.69 | 4.47 | 6.89 | 13.68 | 27.14 | 16.40 | 26.54 | 35.72 | 27.27 | 33.72 |
| Milk Dry | 83.81 | 87.12 | 82.43 | 77.03 | 82.93 | 89.25 | 95.34 | 91.62 | 96.44 | 92.75 | 93.83 | 79.66 |
| Whey Preserved and Concentrated | 61.25 | 49.87 | 87.86 | 70.35 | 56.65 | 84.85 | 70.14 | 64.79 | 80.02 | 72.27 | 64.88 | 63.16 |
| Butter | 47.59 | 47.81 | 46.37 | 55.04 | 60.00 | 59.36 | 57.78 | 79.04 | 61.96 | 72.58 | 67.56 | 64.51 |
| Cheese and Curd | 31.89 | 35.67 | 35.10 | 40.82 | 44.82 | 52.62 | 51.19 | 52.62 | 61.71 | 67.61 | 62.39 | 54.87 |

**Source: Estimated complied using data from FAO Trade Yearbook, Various Issues, (1980-2001) and FAO Production Yearbook, Various Issues, (1990-2001).**

**Table 5.4: Thailand's Export Propensity, 1990-2001**

| Year | Milk Condensed and Evaporated |
|---|---|
| 1990 | 13.07 |
| 1991 | 30.37 |
| 1992 | 54.96 |
| 1993 | 19.81 |
| 1994 | 19.25 |
| 1995 | 27.27 |
| 1996 | 57.97 |
| 1997 | 72.01 |
| 1998 | 85.12 |
| 1999 | 73.82 |
| 2000 | 94.71 |
| 2001 | 362.13 |

**Source: Estimated complied using data from FAO Trade Yearbook, Various Issues, (1980-2001) and FAO Production Yearbook, Various Issues, (1990-2001).**

## 5.4.3 Import Penetration Ratio (MP)

The import penetration ratio is an indicator of international competition faced by a domestic industry. The import penetration ratio ($MP_{ad}$) for dairy products is defined as the percentage ratio of dairy imports divided by apparent consumption (total domestic sales) of dairy products, as follows:

$$MP_{ad} = (M_{ad} / DS_{ad}) * 100 \qquad\qquad (5.3)$$

where;

$M$ = imports of dairy product $d$ by country $a$;

$DS_{ad}$ = total domestic sales of dairy product $d$ by country $a$.

As the data of total domestic sales of both countries are not available, total domestic sales of Australia and Thailand are indirectly calculated as follows:

$$DS_{ad} = (DP_{ad} - X_{ad}) + M_{ad} \qquad\qquad (5.4)$$

where;

$DP_{ad}$ = domestic production of product $d$ by country $a$;

$X_{ad}$ = exports of dairy product $d$ by country $a$;

$M_{ad}$ = imports of dairy product $d$ by country $a$.

A higher import penetration ratio ($MP_{ad}$) indicates that country $a$ has a high degree comparative disadvantage in that industry.

As shown in Table 5.5, Australia has low import penetration ratios for all the dairy products, reflecting comparative advantage that Australia has in these products. On the other hand, Thailand has low import penetration ratios for milk condensed and evaporated during 1990-1996, indicating comparative advantage that Thailand had in these products. However, during 1997-2000, import penetration of this dairy product in Thailand has been relative high. This may be a result of the financial crisis that reduced domestic production and hence raised imports.

**Table 5.5: Australia's Import Penetration Ratios for Dairy Products, 1990-2001**

| Product | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Milk Condensed and Evaporated | 0.51 | 0.26 | 0.46 | 0.46 | 0.70 | 1.32 | 2.07 | 1.37 | 2.09 | 1.35 | 1.62 | 1.65 |
| Milk Dry | 6.94 | 9.39 | 11.50 | 9.63 | 7.16 | 11.99 | 25.95 | 15.68 | 32.01 | 24.60 | 21.53 | 8.00 |
| Whey Preserved and Concentrated | 13.36 | 8.37 | 24.46 | 7.53 | 7.750 | 30.95 | 12.05 | 12.87 | 18.05 | 14.49 | 11.05 | 8.53 |
| Butter | 1.88 | 1.89 | 3.17 | 3.11 | 3.42 | 5.08 | 8.21 | 11.74 | 6.70 | 13.18 | 16.23 | 15.00 |
| Cheese and Curd | 14.79 | 16.34 | 16.37 | 16.97 | 17.51 | 21.00 | 20.77 | 18.47 | 19.86 | 26.88 | 21.68 | 21.55 |

**Source: Estimated complied using data from FAO Trade Yearbook, Various Issues, (1980-2001) and FAO Production Yearbook, Various Issues, (1990-2001).**

**Table 5.6: Thailand's Import Penetration Ratio, 1990-2001**

| Year | Milk Condensed and Evaporated |
|---|---|
| 1990 | 0.82 |
| 1991 | 0.82 |
| 1992 | 1.33 |
| 1993 | 0.24 |
| 1994 | 0.36 |
| 1995 | 0.19 |
| 1996 | 1.25 |
| 1997 | 21.87 |
| 1998 | 28.93 |
| 1999 | 13.32 |
| 2000 | 73.48 |

**Source: Estimated complied using data from FAO Trade Yearbook, Various Issues, (1980-2001) and FAO Production Yearbook, Various Issues, (1990-2001).**

## 5.4.4 Export/Import Ratio (EIR)

To identify the international competitiveness of Australia's and Thailand's dairy products, a ratio of exports to imports can be calculated. The export/import ratio was first used in Verdoon (1960). A high ratio of exports (X) to imports (M) of an industry indicates a higher level of international competitiveness in that industry.

$$EIR_{ad} = (X_{ad} / M_{ad})*100 \qquad\qquad (5.5)$$

Sheehan et al (1994) calculated EIR for elaborately transformed manufactures (ETM$_s$) of Australia as the log of the ratio of exports to imports as follows:

$$EIR_{ad} = \log (X_{ad} / M_{ad}) \qquad\qquad (5.6)$$

If EIR is positive, country $a$ has international competitiveness in that industry. In contrast, if country $a$ has a negative EIR value, it indicates that country $a$ does not have international competitiveness in that industry. The following analysis uses EIR as derived by Sheehan et al (1994).

As seen in Tables 5.7 and 5.8, Australia's dairy products are internationally competitive, reflecting positive values of EIR for all the categories. On the other hand, Thailand has negative values for four dairy products (milk dry, whey preserved and concentrated, cheese and curd, butter). Thus, Thailand does not have international competitiveness in dairy products and a remarkable increase of imports for domestic demand in each year (the Department of Customs, 2002). However, for milk condensed and evaporated, Thailand's EIRs are positive, confirming the comparative advantage that the country has in this dairy product category.

**Table 5.7: Australia's Exports/Imports Ratios for Dairy Products, 1990-2001**

| Product | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Milk Condensed and Evaporated | 0.75 | 1.11 | 0.92 | 1.00 | 1.02 | 1.07 | 1.24 | 1.15 | 1.23 | 1.6 | 1.36 | 1.48 |
| Milk Dry | 1.84 | 1.81 | 1.56 | 1.5 | 1.8 | 1.78 | 1.77 | 1.77 | 1.76 | 1.59 | 1.74 | 1.65 |
| Whey Preserved and Concentrated | 1.01 | 1.04 | 1.35 | 1.46 | 1.19 | 1.1 | 1.23 | 1.09 | 1.26 | 1.19 | 1.17 | 1.26 |
| Butter | 1.68 | 1.68 | 1.42 | 1.58 | 1.63 | 1.44 | 1.18 | 1.45 | 1.35 | 1.24 | 1.03 | 0.99 |
| Cheese and Curd | 0.43 | 0.45 | 0.44 | 0.53 | 0.58 | 0.62 | 0.60 | 0.69 | 0.81 | 0.75 | 0.78 | 0.64 |

**Source: Estimated complied using data from FAO Trade Yearbook, Various Issues, (1980-2001).**

**Table 5.8: Thailand's Exports/Imports Ratios for Dairy Products, 1990-2001**

| Product | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Milk Condensed and Evaporated | 1.26 | 1.72 | 1.96 | 2.01 | 1.82 | 2.29 | 2.04 | 0.96 | 1.15 | 1.26 | 0.81 | 1.62 |
| Milk Dry | -1.51 | -1.24 | -1.56 | -1.39 | -1.16 | -1.71 | -1.65 | -1.67 | -1.50 | -1.54 | -1.60 | -1.53 |
| Whey Preserved and Concentrated | -0.27 | -1.03 | -1.34 | -1.20 | -1.37 | -1.50 | -1.57 | -1.32 | -1.54 | -1.53 | -1.21 | -1.34 |
| Butter | na | -2.43 | -4.15 | -3.79 | na | -3.48 | -3.28 | -3.26 | -3.72 | -2.27 | -2.29 | -2.88 |
| Cheese and Curd | -2.37 | -3.07 | -3.13 | -2.45 | -2.17 | -0.56 | -2.48 | -1.12 | -1.53 | -1.01 | -1.76 | -2.10 |

Note: na not available.
**Source: Estimated complied using data from FAO Trade Yearbook, Various Issues, (1980-2001).**

## 5.5 Revealed Comparative Advantage (RCA)

## 5.5.1 Balassa's Index of Revealed Comparative Advantage (RCA)

Balassa (1965) explained that comparative advantage can be revealed in the real world, country and commodity due to differences in relative factor endowments. The revealed comparative advantage (RCA) is derived from post-trade data. RCA can be measured by the relative share of a commodity/industry in a country's total exports, divided by a commodity/industry relative share in total world exports:

$$RCAI_{ad} = (X_{ad}/ X_a) / (X_{wd} / X_w) \qquad\qquad (5.7)$$

Where;

$RCAI_{ad}$ = the revealed comparative advantage index for industry $d$ of country $a$;

$X_{ad}$ = exports of industry $d$ of country $a$;

$X_a$ = total exports of country $a$;

$X_{wd}$ = total world exports of industry $d$;

$X_w$ = total world exports.

The value of the RCA index less than one occurs when the commodity's share in a country's exports is less than its share in world trade. This indicates that the country has a revealed comparative disadvantage in the trade of that commodity. In contrast, if the ratio is greater than one, the country has a revealed comparative advantage. The RCA index has been extensively employed in the studies of Balassa (1979, 1989), Yamazawa (1970), Kojima (1970), Hillman (1980), Yeats (1985), Tan (1992), Son and Wilson (1995), and Havrila and Gunawardana (2003).

However, Yeats (1985) commented that a shortcoming of Balassa's RCA index is that it cannot provide either an ordinal or a cardinal measure of a country's revealed

comparative advantage. Ballance et al (1987) also pointed out that inconsistencies occur in the use of RCA indexes as a cardinal or ordinal measure.

## 5.5.2 Revealed Comparative Advantage (RCA) in Dairy Products

The United Nations (UN) and Food and Agricultural Organisation (FAO) classify dairy products into five categories under Standard International Trade Classification (SITC). These are milk condensed and evaporated (SITC 022.49), milk dry (SITC 022.42/43), whey preserved and concentrated (SITC 022.41), butter (023), and cheese and curd (024). Trade data for dairy products from ten exporting countries, i.e. Australia, Thailand, New Zealand, the U.S.A, Denmark, France, Germany, Ireland, Netherlands, and the U.K. are utilised in the analysis in this section for the above five categories of dairy products. Balassa's revealed comparative advantage index (RCA) is used as an empirical measure to test the degree of RCA in dairy products for each of the ten countries. The data used in the analysis of RCA are given in Appendix 5.2.

Table 5.9 shows that Netherlands, Germany, Australia, Thailand, and New Zealand have a high degree of RCA in milk condensed and evaporated. Their RCA indexes are greater than one. The Netherlands has the highest RCA index of 6.31 for 2001. These results imply that the Netherlands has also a high export share, which exceeds its share in the total world exports. Similarly, these can be applied to other exporting countries for example Germany, Australia, Thailand and New Zealand. In contrast, RCA indexes for France, the U.S.A, the U.K, Denmark and Ireland is less than one, reflecting the lower export share of this product than the total world exports. Thus, both Australia and Thailand have a revealed comparative advantage in this product.

As shown in Table 5.10, there are six countries that export milk dry with RCA indexes greater than one. First to sixth rank in 2001 were New Zealand, Australia, Denmark, Netherlands, Ireland and France. Germany, the U.K, the U.S.A and Thailand do not have revealed comparative advantage in milk dry. In particular, Thailand has a very low degree of RCA index for milk dry at 0.05 in 2000-2001. The indication is that Thailand has large import demand for milk dry to use in milk processing industry.

The results presented in Table 5.11 illustrate that Denmark, France, Australia, Ireland, New Zealand, Netherlands, Germany and the U.S.A are with a relatively high degree of RCA in whey preserved and concentrated. The RCA index for these countries is more than one. The results imply that Denmark has the highest export share in the total world exports. This is followed by France, Australia, Ireland, New Zealand, Netherlands, Germany and the U.S.A, respectively. In contrast, Thailand and the U.K have RCA indexes less than one for whey preserved and concentrated.

As shown in Table 5.12, six of the countries that export butter with RCA index greater than one are New Zealand, Ireland, Denmark, Australia, Netherlands, and France. New Zealand has the highest RCA index at 88.03, reflecting the largest export share of butter in the world market. On the other hand, the butter importing countries are the U.S.A, the U.K, Germany and Thailand with RCA indexes less than one. The indication is that these countries importing butter have lower export shares in the total world exports. In particular, Thailand has the lowest RCA index. Hence, Thailand has a high import demand for butter in its domestic market.

The results presented in Table 5.13 identify that the countries with a relatively high degree of RCA in cheese and curd are New Zealand, Denmark, Australia, France, Netherlands and Ireland. The RCA indexes for these countries are greater than one. Specially, New Zealand has the highest RCA index. This result implies that New Zealand has large export share which exceeds its share in the total world exports. These can also be applied to other cheese and curd exporting countries. On the other hand, cheese and curd importing countries, the U.K, the U.S.A and Thailand, have RCA indexes lower than one. The indication is that these importing countries have lower export share of cheese and curd than the total world exports.

Table 5.14 presents the aggregate of the three dairy products (SICT: 022, 023, 024) based on the estimation of Balassa's RCA index. The six major dairy product-exporting countries with a relatively high degree of RCA are New Zealand, Denmark, Australia, Netherlands, France and Ireland. The results show that New Zealand has the largest RCA

index at 42.04 (in 2001), indicating the largest export share of dairy products in the world market. In contrast, the U.K, Thailand and the U.S.A have RCA indexes less than one. The indication is that these countries have lower export shares in the total world exports.

Since the focus of this thesis is mainly on Australia and Thailand, it is interesting to note that these results confirm the revealed comparative advantage that Australia has in dairy products as an aggregate commodity category. In contrast, Thailand has revealed comparative disadvantage in dairy products as an aggregate commodity category. However, the analysis for disaggregated dairy product categories shows that, while Australia has revealed comparative advantage in all five of the categories considered, Thailand has revealed comparative disadvantage in four categories and revealed comparative advantage in milk condensed and evaporated.

**Table 5.9: Balassa's Revealed Comparative Advantage Indexes for Australia and Other Exporting Countries: SITC 022.49 Milk Condensed and Evaporated**

| Country | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Australia | 0.25 | 0.25 | 0.32 | 0.23 | 0.32 | 0.60 | 1.02 | 1.73 | 0.97 | 1.45 | 2.53 | 2.05 |
| Thailand | 0.14 | 0.59 | 0.80 | 1.11 | 1.44 | 1.63 | 2.11 | 1.75 | 1.74 | 1.74 | 2.07 | 5.37 |
| New Zealand | 0.70 | 0.70 | 0.99 | 0.65 | 1.00 | 0.91 | 1.16 | 1.56 | 1.87 | 4.08 | 2.70 | 1.82 |
| the U.S.A | 0.02 | 0.05 | 0.09 | 0.07 | 0.12 | 0.17 | 0.15 | 0.04 | 0.05 | 0.03 | 0.04 | 0.07 |
| Denmark | 0.02 | 0.04 | 0.05 | 0.02 | 0.01 | 0.004 | 0.01 | 0.01 | 0.01 | 0.005 | 0.004 | 0.30 |
| France | 0.93 | 0.85 | 1.14 | 1.14 | 1.02 | 1.04 | 0.85 | 0.92 | 0.77 | 0.85 | 1.15 | 0.76 |
| Germany | 1.90 | 2.00 | 2.54 | 2.45 | 2.76 | 2.85 | 2.82 | 3.10 | 2.88 | 3.06 | 3.49 | 2.95 |
| Ireland | 0.56 | 0.14 | 0.34 | 0.24 | 0.36 | 0.37 | 0.06 | 0.07 | 0.03 | 0.01 | 0.01 | 0.005 |
| Netherlands | 11.84 | 10.37 | 10.23 | 10.64 | 9.71 | 8.01 | 7.99 | 6.07 | 6.04 | 7.00 | 6.74 | 6.31 |
| the U.K | 0.84 | 0.91 | 0.94 | 0.84 | 0.90 | 1.06 | 0.96 | 1.04 | 1.11 | 0.96 | 0.66 | 0.43 |

Source: Estimated using data from the United Nations, 1973-2003, International Trade Statistics Yearbook and FAO, 1990-2001, FAO Trade Yearbook.

**Table 5.10: Balassa's Revealed Comparative Advantage Indexes for Australia and Other Exporting Countries: SITC 022.42/43 Milk Dry**

| Country | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Australia | 4.62 | 4.89 | 4.12 | 5.30 | 6.05 | 5.92 | 8.40 | 8.08 | 9.08 | 9.81 | 10.41 | 9.89 |
| Thailand | 0.11 | 0.12 | 0.07 | 0.08 | 0.20 | 0.07 | 0.09 | 0.09 | 0.11 | 0.08 | 0.05 | 0.05 |
| New Zealand | 40.03 | 47.98 | 42.61 | 45.42 | 44.66 | 40.32 | 50.59 | 65.23 | 65.53 | 63.96 | 73.23 | 93.80 |
| the U.S.A | 0.04 | 0.12 | 0.22 | 0.26 | 0.18 | 0.24 | 0.07 | 0.21 | 0.25 | 0.25 | 0.24 | 0.28 |
| Denmark | 5.36 | 4.40 | 4.13 | 4.10 | 5.06 | 3.91 | 4.50 | 4.84 | 5.45 | 4.50 | 3.83 | 3.06 |
| France | 2.60 | 2.17 | 1.92 | 1.95 | 2.34 | 2.16 | 2.05 | 2.26 | 1.99 | 1.95 | 1.92 | 1.52 |
| Germany | 1.151 | 1.75 | 1.89 | 1.87 | 1.46 | 1.36 | 1.54 | 1.23 | 1.19 | 1.17 | 1.15 | 0.95 |
| Ireland | 6.53 | 5.74 | 13.82 | 7.91 | 5.97 | 7.32 | 3.86 | 4.66 | 2.18 | 3.42 | 3.88 | 1.85 |
| Netherlands | 4.54 | 3.10 | 3.21 | 3.39 | 2.70 | 3.00 | 2.59 | 2.41 | 2.49 | 2.69 | 2.53 | 2.16 |
| the U.K | 1.24 | 1.02 | 1.04 | 0.89 | 0.98 | 0.90 | 0.72 | 0.96 | 1.02 | 0.91 | 0.92 | 0.66 |

Source: Estimated using data from the United Nations, 1973-2003, International Trade Statistics Yearbook and FAO, 1990-2001, FAO Trade Yearbook.

**Table 5.11: Balassa's Revealed Comparative Advantage Indexes for Australia and Other Exporting Countries: SITC 022.41 Whey Preserved and Concentrated**

| Country | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Australia | 1.19 | 0.92 | 1.86 | 2.48 | 1.93 | 2.62 | 2.96 | 2.72 | 3.48 | 4.39 | 3.81 | 4.07 |
| Thailand | 2.45 | 0.27 | 0.06 | 0.10 | 0.05 | 0.05 | 0.06 | 0.13 | 0.05 | 0.09 | 0.11 | 0.10 |
| New Zealand | na | na | 2.02 | 2.15 | 2.74 | 2.15 | 2.48 | 2.76 | 2.30 | 3.09 | 2.22 | 3.86 |
| the U.S.A | 0.84 | 1.09 | 0.93 | 1.03 | 1.17 | 1.19 | 1.38 | 1.34 | 1.19 | 1.30 | 1.51 | 1.24 |
| Denmark | 5.81 | 4.92 | 5.30 | 4.12 | 5.30 | 4.45 | 5.51 | 4.23 | 4.81 | 0.47 | 5.73 | 5.12 |
| France | 5.12 | 5.55 | 5.78 | 5.51 | 5.57 | 5.38 | 5.21 | 4.76 | 4.80 | 5.11 | 5.08 | 5.06 |
| Germany | 0.69 | 0.95 | 1.14 | 1.53 | 1.54 | 1.27 | 1.28 | 1.26 | 1.29 | 1.17 | 1.52 | 1.54 |
| Ireland | 11.93 | 9.52 | 11.47 | 7.74 | 5.38 | 7.88 | 6.31 | 6.59 | 3.83 | 4.43 | 4.02 | 3.98 |
| Netherlands | 5.73 | 5.00 | 4.41 | 4.73 | 4.51 | 4.03 | 3.69 | 3.72 | 3.79 | 3.65 | 3.53 | 3.00 |
| the U.K | 0.76 | 0.50 | 0.63 | 0.37 | 0.37 | 0.45 | 0.46 | 0.52 | 0.41 | 0.43 | 0.52 | 0.72 |

**Source: Estimated using data from the United Nations, 1990-2001, International Trade Statistics Yearbook and FAO, 1980-2001, FAO Trade Yearbook.**

**Table 5.12: Balassa's Revealed Comparative Advantage Indexes for Australia and Other Exporting Countries: SITC 023 Butter**

| Country | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Australia | 2.52 | 1.98 | 2.21 | 2.80 | 3.42 | 2.76 | 3.72 | 4.31 | 4.60 | 0.54 | 6.00 | 4.90 |
| Thailand | na | 0.002 | 0.0002 | 0.00009 | na | 0.00009 | 0.0001 | 0.0001 | 0.0003 | 0.0003 | 0.003 | 0.001 |
| New Zealand | 48.45 | 44.91 | 40.73 | 46.25 | 49.71 | 41.85 | 55.82 | 67.31 | 68.42 | 5.61 | 88.03 | 66.86 |
| the U.S.A | 0.31 | 0.11 | 0.39 | 0.40 | 0.27 | 0.13 | 0.09 | 0.06 | 0.03 | 0.001 | 0.03 | 0.01 |
| Denmark | 5.81 | 4.92 | 5.30 | 4.12 | 5.30 | 4.45 | 5.51 | 4.23 | 4.81 | 0.47 | 5.73 | 5.12 |
| France | 1.71 | 1.55 | 1.23 | 1.41 | 1.46 | 1.42 | 1.27 | 1.16 | 1.00 | 0.10 | 1.33 | 1.26 |
| Germany | 0.58 | 1.13 | 0.58 | 0.60 | 0.47 | 0.57 | 0.48 | 0.44 | 0.38 | 0.04 | 0.57 | 0.47 |
| Ireland | 11.58 | 19.22 | 21.60 | 17.57 | 14.94 | 16.25 | 12.56 | 13.38 | 8.87 | 0.89 | 9.50 | 7.44 |
| Netherlands | 4.88 | 4.79 | 5.60 | 5.71 | 4.57 | 3.94 | 4.00 | 3.74 | 3.73 | 0.39 | 3.07 | 3.79 |
| the U.K | 0.82 | 0.66 | 1.00 | 1.08 | 1.16 | 1.07 | 1.04 | 1.20 | 1.12 | 0.10 | 1.01 | 0.90 |

**Source: Estimated using data from the United Nations, 1990-2001, International Trade Statistics Yearbook and FAO, 1980-2001, FAO Trade Yearbook.**

**Table 5.13: Balassa's Revealed Comparative Advantage Indexes for Australia and Other Exporting Countries: SITC 024 Cheese and Curd Milk**

| Country | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|---------|------|------|------|------|------|------|------|------|------|------|------|------|
| Australia | 1.59 | 1.63 | 1.71 | 2.17 | 2.31 | 2.63 | 2.73 | 3.11 | 3.74 | 4.33 | 5.00 | 4.38 |
| Thailand | 0.0002 | 0.00003 | 0.00004 | 0.00005 | 0.00006 | 0.002 | 0.00005 | 0.0006 | 0.0009 | 0.0003 | 0.0003 | 0.0002 |
| New Zealand | 9.12 | 9.59 | 4.85 | 9.91 | 10.40 | 13.14 | 12.85 | 20.86 | 19.36 | 21.51 | 22.77 | 24.21 |
| USA | 0.05 | 0.04 | 0.05 | 0.06 | 0.07 | 0.08 | 0.09 | 0.10 | 0.09 | 0.11 | 0.11 | 0.13 |
| Denmark | 8.45 | 7.71 | 7.81 | 8.24 | 8.59 | 8.95 | 8.91 | 10.16 | 10.12 | 10.53 | 11.04 | 9.38 |
| France | 3.27 | 3.21 | 3.33 | 3.70 | 3.57 | 3.65 | 3.56 | 3.48 | 3.21 | 3.39 | 3.76 | 3.28 |
| Germany | 0.51 | 0.48 | 0.52 | 0.55 | 0.57 | 0.51 | 0.60 | 0.64 | 0.58 | 0.54 | 0.62 | 0.60 |
| Ireland | 5.17 | 4.40 | 5.71 | 3.30 | 4.21 | 3.29 | 3.55 | 2.98 | 1.85 | 2.135 | 2.10 | 2.28 |
| Netherlands | 5.85 | 6.04 | 6.48 | 5.97 | 5.63 | 5.00 | 5.16 | 4.42 | 4.26 | 4.41 | 4.10 | 3.70 |
| UK | 0.35 | 0.37 | 0.39 | 0.42 | 0.42 | 0.38 | 0.40 | 0.34 | 0.37 | 0.43 | 0.41 | 0.43 |

**Source: Estimated using data from the United Nations, 1973-2003, International Trade Statistics Yearbook and FAO, 1980-2001, FAO Trade Yearbook.**

**Table 5.14: Balassa's Revealed Comparative Advantage Indexes for Australia and Other Exporting Countries: SICT: 022,023,024 Total Dairy Products**

| Country | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|---------|------|------|------|------|------|------|------|------|------|------|------|------|
| Australia | 2.41 | 2.34 | 2.31 | 2.90 | 3.18 | 3.38 | 4.04 | 4.14 | 4.61 | 5.33 | 5.83 | 5.31 |
| Thailand | na | 0.07 | 0.07 | 0.09 | na | 0.10 | 0.11 | 0.12 | 0.19 | 0.12 | 0.12 | 0.30 |
| New Zealand | 22.03 | 17.10 | 13.60 | 17.34 | 17.88 | 18.67 | 22.81 | 34.18 | 32.22 | 31.98 | 38.23 | 42.04 |
| USA | 0.11 | 0.11 | 0.18 | 0.20 | 0.16 | 0.16 | 0.12 | 0.15 | 0.15 | 0.15 | 0.17 | 0.18 |
| Denmark | 6.05 | 5.29 | 5.205 | 5.17 | 5.79 | 5.36 | 5.70 | 6.08 | 6.12 | 6.36 | 6.50 | 5.49 |
| France | 2.78 | 2.58 | 2.58 | 2.76 | 2.89 | 2.81 | 2.73 | 2.71 | 2.50 | 2.67 | 2.87 | 2.55 |
| Germany | 1.37 | 1.66 | 1.73 | 1.72 | 1.64 | 1.57 | 1.69 | 1.74 | 1.62 | 1.50 | 1.72 | 1.54 |
| Ireland | 6.10 | 6.78 | 9.66 | 6.55 | 5.83 | 6.22 | 4.52 | 4.62 | 2.70 | 3.19 | 3.21 | 2.47 |
| Netherlands | 5.19 | 4.72 | 4.97 | 4.87 | 4.38 | 3.95 | 3.97 | 3.44 | 3.35 | 3.65 | 3.27 | 2.99 |
| UK | 0.71 | 0.67 | 0.75 | 0.78 | 0.82 | 0.78 | 0.69 | 0.74 | 0.78 | 0.78 | 0.73 | 0.63 |

**Source: Estimated using data from the United Nations, 1973-2003, International Trade Statistics Yearbook and FAO, 1980-2001, FAO Trade Yearbook.**

## 5.6 Vollrath's Indexes of Revealed Competitive Advantage (RCA)

Vollrath (1991) investigated alternative indexes and tested trends of international competitiveness in agriculture under the RCA model. He pointed out that the estimation of comparative advantage would be especially beneficial if the focus is on trade between countries with different factor endowments. He emphasises that RCA is significant to differentiate between two countries' trade links and their economic association with the rest of the world. Hence, Vollrath (1991) demonstrated that RCA can be estimated under international competitiveness. It was determined in four principal areas under RCA theory. These are relative trade advantage ($RTA_{ad}$), revealed competitiveness index ($RC_{ad}$), the relative export advantage ($RXA_{ad}$), and relative import advantage ($RMA_{ad}$). Vollrath's indexes as presented in Havrila and Gunawardana (2003), .are specified below:

$$RTA_{ad} = RXA_{ad} - RMA_{ad} \qquad (5.8)$$

$$RC_{ad} = Ln (RXA_{ad}) - Ln (RMA_{ad}) \qquad (5.9)$$

$$RXA_{ad} = (X_{ad} / X_{na}) \ / \ (X_{dr} / X_{nr}) \qquad (5.10)$$

$$RMA_{ad} = (M_{ad} / M_{na}) \ / \ (M_{dr} / M_{nr}) \qquad (5.11)$$

Where;

$RTA_{ad}$ = relative trade advantage of country $a$ in dairy product $d$;

$RC_{ad}$ = revealed competitiveness index of country $a$ in dairy product $d$;

$RXA_{ad}$ = relative export advantage of country $a$ in dairy product $d$;

$RMA_{ad}$ = relative import advantage of country $a$ in dairy product $d$;

$X_{ad}$ = exports of dairy product $d$, by country $a$;

$X_{na}$ = exports of all commodities, excluding dairy product $d$, by country $a$;

$X_{dr}$ = exports of dairy product $d$, by the rest of the world, excluding country $a$;

$X_{nr}$ = exports of all commodities excluding dairy product $d$, by all countries in the world excluding country $a$;

$M_{ad}$ = imports of dairy product $d$, by country $a$;

$M_{na}$ = imports of all commodities, excluding dairy product $d$, by country $a$;

$M_{dr}$ = imports of dairy product $d$, by the rest of the world;

$M_{nr}$ = imports of all commodities, excluding dairy product $d$, by all countries in the world, excluding country $a$;

$X$ = exports;

$M$ = imports;

$n$ = rest of the commodities;

$r$ = rest of the world;

$Ln$ = the natural logarithm.

According to Vollrath (1991), positive values of $RXA_{ad}$, $RTA_{ad}$, and $RC_{ad}$ indicate revealed competitive advantage while negative values indicate revealed competitive disadvantage. Vollrath's indexes have been applied to investigate revealed competitive advantage of some industries of certain countries, for example, in Chuankamnerdkarn (1997), and Havrila and Gunawardana (2003).

## 5.6.1 Vollrath's Indexes of Revealed Competitiveness: An Application to Dairy Products of Australia, Thailand and Other Exporting Countries

In this section, the UN and FAO data are used for the estimation of revealed competitiveness in all the dairy products of Australia, Thailand and New Zealand, and Denmark and Netherlands to represent the major dairy export countries in the EU. The dairy products chosen are classified according to the same classification as for the estimation of Balassa's RCA. The time series data for dairy product exports and imports for the period 1990-2001 were used in the analysis. The revealed competitiveness in terms of the three measurements of relative trade advantage (RTA), revealed competitiveness index (RC) and relative export advantage (RXA).

All three RCA indexes presented above eliminate country and commodity double counting in world trade as they embody a country's export share of dairy products relative to all commodities other than dairy products. RTA and RC encompass both export and import sides that relate to trade in practice.

As shown in Table 5.15, Australia has positive values of RXA, RMA and RTA. Hence, Australia has revealed competitive advantage in all of the dairy product categories, as well as for dairy products as an aggregate category. Australia has the highest RXA and RTA indexes indicating the most export advantage in the world for whey preserved and concentrated. Australia also has a trade surplus of the dairy products and a major supplier in the world market.

Results presented in Tables 5.16 show that, Thailand's RTA and RC indexes are negative for four categories: milk dry, whey preserved and concentrated, butter and curd, and total dairy products. Thailand has a trade deficit and has revealed competitive disadvantage in all of these products. However, positive values of the RXA, RTA and RXA indexes for milk condensed and evaporated show that Thailand has revealed competitive advantage in this category. Thailand has positive values of RXA for all other diary products, indicating a small export share of these products in aggregate world exports.

As shown in Table 5.17, New Zealand's RXA, RTA and RC indexes are positive for four milk condensed and evaporated, butter, cheese and cured, and total dairy products, reflecting revealed competitive advantage in these products. New Zealand's RXA and RTA for milk dry, butter and total dairy products are the highest, indicating New Zealand's prominence among exporters of these products in the world market. However, RTA and RC of New Zealand are negative for whey preserved and concentrated. There exhibit that NEW Zealand has revealed competitive disadvantage in this category.

Result presented in Table 5.18 indicate that Denmark's RXA, RTA and RC indexes are positive for milk dry, whey products, butter, cheese and curd, and total dairy products. Hence, Denmark has revealed competitive advantage and has trade surplus in these products. Denmark is one of the principal exporters of these products in the

world market among the EU countries In contrast, negative values for RTA and RC indexes for milk condensed and evaporated show that Denmark has competitive disadvantage in this product category.

Among the EU countries, Netherlands is one of the major dairy product exporters. Netherlands has positive values of RXA, RTA and RC for milk condensed and evaporated, butter, cheese and curd, and total dairy products. The indication is that Netherlands has competitive advantage in these products. However, for milk dry and whey products, Netherlands' RTA and RC indexes are negative, reflecting revealed competitive disadvantage in these dairy products.

## 5.6 Conclusion

In Chapter 5, an analysis of revealed comparative advantage and revealed competitive advantage of Australia, Thailand and other major dairy exporting countries was conducted. The measures of trade specialisation index (TSI), export propensity (EPI), import penetration (MP), and export/import ratio (EIR) were estimated as indicators of comparative advantage in dairy products of Australia and Thailand. The product classification is based on SITC of the UN and FAO: milk evaporated (022.49), milk dry (022.42/43), whey preserved and concentrated (022.41), butter (023), and cheese and curd (024). Balassa's index of revealed comparative advantage (RCA) and Vollrath's indexes of revealed competitive advantage (RXA, RTA and RC) were estimated for these dairy products of Australia, Thailand, New Zealand and some of the EU countries.

The results of TSI, EPI, MP, and EIR identify that among the dairy product exporting countries, Australia has revealed comparative advantage and revealed competitive advantage of all of the dairy products. On the other hand, Thailand has revealed comparative advantage and revealed competitive advantage only in milk condensed and evaporated. Thailand has revealed comparative disadvantage and revealed competitive disadvantage in the other dairy product categories. New Zealand, and the selected EU countries have comparative and competitive advantages in most of the dairy products.

Thailand is one of main dairy product importing countries in the world market. Australia is closer to Thailand than other major dairy product exporting countries. Australia could focus on increasing the volumes of all of the dairy products exported to Thailand, except milk condensed and evaporated. In accordance with Australia-Thailand Free trade agreement (FTA), Thailand will reduce the import barriers on exports of dairy products of Australia. This will be beneficial to Australia's dairy product exporters to Thailand.

Chapter 6 will present an analysis of Thailand's demand for Australia's exports of dairy products. Chapter 6 will begin with a review of theory and empirical studies on the determinants of export demand. Then, a model of Thailand's demand for Australia's dairy product exports will be developed and estimated.

**Table 5.15: Vollrath's Revealed Competitive Advantage Indexes for Dairy Products: Australia**

RXA

| Year | 022.49 (Milk condensed and evaporated) | 022.42/43 (Milk dry) | 022.41 (Whey preserved and concentrated) | 023 (Butter) | 024 (Cheese and Cure) | 022,023,024 (Total Dairy Products) |
|------|------|------|------|------|------|------|
| 1990 | 0.23 | 4.85 | 23.83 | 2.57 | 1.61 | 2.48 |
| 1991 | 0.32 | 5.17 | 19.33 | 2.00 | 1.65 | 2.40 |
| 1992 | 0.22 | 4.29 | 40.60 | 2.24 | 1.73 | 2.37 |
| 1993 | 0.32 | 5.63 | 54.52 | 2.87 | 2.21 | 3.00 |
| 1994 | 0.60 | 6.47 | 46.84 | 3.53 | 2.35 | 3.30 |
| 1995 | 1.02 | 6.30 | 71.72 | 2.82 | 2.68 | 3.52 |
| 1996 | 1.75 | 9.29 | 92.63 | 3.85 | 2.79 | 4.26 |
| 1997 | 0.97 | 8.90 | 88.33 | 4.50 | 3.20 | 4.37 |
| 1998 | 1.46 | 10.04 | 101.46 | 4.80 | 3.88 | 4.89 |
| 1999 | 2.58 | 10.91 | 129.68 | 6.51 | 4.51 | 5.69 |
| 2000 | 2.08 | 11.69 | 127.71 | 6.35 | 5.26 | 6.27 |
| 2001 | 1.99 | 11.09 | 136.73 | 5.13 | 4.58 | 5.69 |

RTA

| Year | 022.49 | 022.42/43 | 022.41 | 023 | 024 | Total (022,023,024) |
|------|------|------|------|------|------|------|
| 1990 | 0.17 | 4.79 | 23.37 | 2.52 | 0.92 | 2.16 |
| 1991 | 0.24 | 5.09 | 19.14 | 1.95 | 0.86 | 2.04 |
| 1992 | 0.16 | 4.18 | 40.44 | 2.17 | 1.01 | 2.03 |
| 1993 | 0.25 | 5.49 | 54.13 | 2.82 | 1.47 | 2.64 |
| 1994 | 0.46 | 6.38 | 46.52 | 3.45 | 1.68 | 2.96 |
| 1995 | 0.83 | 6.21 | 71.27 | 2.72 | 1.97 | 3.19 |
| 1996 | 1.49 | 9.17 | 92.14 | 3.62 | 1.98 | 3.85 |
| 1997 | 0.75 | 8.76 | 87.66 | 4.26 | 2.38 | 3.96 |
| 1998 | 1.19 | 9.88 | 101.00 | 4.54 | 3.15 | 4.49 |
| 1999 | 2.44 | 10.72 | 129.13 | 6.15 | 3.61 | 5.19 |
| 2000 | 0.49 | 11.55 | 127.11 | 5.85 | 4.30 | 5.75 |
| 2001 | 1.83 | 10.88 | 136.18 | 4.66 | 3.51 | 5.10 |

RC

| Year | 022.49 | 022.42/43 | 022.41 | 023 | 024 | Total (022,023,024) |
|------|------|------|------|------|------|------|
| 1990 | 1.24 | 4.42 | 3.95 | 3.93 | 0.85 | 2.05 |
| 1991 | 1.41 | 4.20 | 4.60 | 3.68 | 0.74 | 1.91 |
| 1992 | 1.27 | 3.69 | 5.57 | 3.46 | 0.87 | 1.94 |
| 1993 | 1.48 | 3.65 | 4.94 | 4.13 | 1.09 | 2.11 |
| 1994 | 1.46 | 4.29 | 4.97 | 3.83 | 1.26 | 2.26 |
| 1995 | 1.69 | 4.26 | 4.95 | 3.31 | 1.33 | 2.36 |
| 1996 | 1.90 | 4.37 | 5.25 | 2.81 | 1.23 | 2.33 |
| 1997 | 1.48 | 4.10 | 4.88 | 2.95 | 1.36 | 2.36 |
| 1998 | 1.70 | 4.15 | 5.41 | 2.90 | 1.67 | 2.49 |
| 1999 | 2.93 | 4.04 | 5.46 | 2.91 | 1.61 | 2.43 |
| 2000 | 0.27 | 4.37 | 5.36 | 2.54 | 1.70 | 2.48 |
| 2001 | 2.54 | 4.00 | 5.53 | 2.39 | 1.45 | 2.27 |

**Source: Estimated using data from the United Nations, 1990-2001, International Trade Statistics Yearbook and FAO, 1990-2001, FAO Trade Yearbook.**

**Table 5.16: Vollrath's Revealed Competitive Advantage Indexes for Dairy Products: Thailand**

**RXA**

| Year | 022.49 (Milk condensed and evaporated) | 022.42/43 (Milk dry) | 022.41 (Whey preserved and concentrated) | 023 (Butter) | 024 (Cheese and cure) | 022,023,024 (Total Dairy Products) |
|---|---|---|---|---|---|---|
| 1990 | 0.14 | 0.11 | 2.48 | na | 0.00018 | na |
| 1991 | 0.59 | 0.12 | 0.27 | 0.0025 | 0.00003 | 0.07 |
| 1992 | 0.80 | 0.07 | 0.06 | 0.0002 | 0.00004 | 0.07 |
| 1993 | 1.12 | 0.08 | 0.10 | 0.0001 | 0.00005 | 0.09 |
| 1994 | 1.45 | 0.19 | 0.05 | na | 0.00006 | na |
| 1995 | 1.64 | 0.07 | 0.05 | 0.0001 | 0.00246 | 0.10 |
| 1996 | 2.13 | 0.09 | 0.06 | 0.0001 | 0.00005 | 0.11 |
| 1997 | 1.77 | 0.09 | 0.13 | 0.0001 | 0.00060 | 0.12 |
| 1998 | 1.75 | 0.11 | 0.05 | 0.0003 | 0.00088 | 0.12 |
| 1999 | 1.75 | 0.08 | 0.08 | 0.0031 | 0.00354 | 0.12 |
| 2000 | 2.10 | 0.05 | 0.10 | 0.0032 | 0.00026 | 0.12 |
| 2001 | 5.65 | 0.05 | 0.10 | 0.0010 | 0.00025 | 0.30 |

**RTA**

| Year | 022.49 | 022.42/43 | 022.41 | 023 | 024 | Total (022,023,024) |
|---|---|---|---|---|---|---|
| 1990 | 0.13 | -2.38 | 1.01 | na | -3.25 | na |
| 1991 | 0.58 | -2.05 | -1.03 | -0.62 | -3.11 | -0.63 |
| 1992 | 0.79 | -2.57 | -0.78 | -0.69 | -3.23 | -0.76 |
| 1993 | 1.11 | -2.14 | -0.86 | -0.50 | -3.28 | -0.63 |
| 1994 | 1.40 | -2.30 | -0.58 | na | -3.19 | na |
| 1995 | 1.63 | -2.16 | -0.68 | -0.30 | -3.22 | -0.68 |
| 1996 | 2.11 | -2.88 | -1.16 | -0.38 | -3.27 | -0.85 |
| 1997 | 1.46 | -4.14 | -2.15 | -0.62 | -2.96 | -1.12 |
| 1998 | 1.55 | -4.68 | -1.84 | -0.80 | -3.03 | -1.19 |
| 1999 | 1.56 | -3.56 | -2.08 | -0.77 | -3.13 | -0.92 |
| 2000 | 1.74 | -2.97 | -2.43 | -0.72 | -3.18 | -0.87 |
| 2001 | 5.49 | -3.21 | -2.64 | -0.69 | -2.72 | -0.78 |

**RC**

| Year | 022.49 | 022.42/43 | 022.41 | 023 | 024 | Total (022,023,024) |
|---|---|---|---|---|---|---|
| 1990 | 2.74 | -3.10 | 0.52 | na | -5.35 | na |
| 1991 | 4.23 | -2.92 | -1.58 | -5.53 | -7.34 | -2.31 |
| 1992 | 4.76 | -3.59 | -2.63 | -8.32 | -6.95 | -2.50 |
| 1993 | 5.05 | -3.32 | -2.26 | -8.66 | -6.53 | -2.08 |
| 1994 | 3.41 | -2.55 | -2.45 | na | -6.60 | na |
| 1995 | 5.08 | -3.50 | -2.65 | -8.16 | -2.78 | -2.02 |
| 1996 | 4.51 | -3.45 | -2.95 | -8.02 | -6.74 | -2.14 |
| 1997 | 1.75 | -3.80 | -2.84 | -8.48 | -4.43 | -2.32 |
| 1998 | 2.16 | -3.76 | -3.62 | -7.98 | -3.99 | -2.41 |
| 1999 | 2.23 | -3.84 | -3.32 | -5.50 | -2.51 | -2.18 |
| 2000 | 1.76 | -4.05 | -3.18 | -5.41 | -5.08 | -2.09 |
| 2001 | 3.55 | -4.17 | -3.30 | -6.58 | -5.57 | -1.29 |

na is not available.
**Source: Estimated using data from the United Nations, 1990-2001, International Trade Statistics Yearbook and FAO, 1990-2001, FAO Trade Yearbook.**

**Table 5.17: Vollrath's Revealed Competitive Advantage Indexes for Dairy Products: New Zealand**

**RXA**

| Year | 022.49 (Milk condensed and evaporated) | 022.42/43 (Milk dry) | 022.41 (Whey preserved and concentrated) | 023 (Butter) | 024 (Cheese and Cure) | 022,023,024 (Total Dairy Products) |
|------|------|------|------|------|------|------|
| 1990 | 0.70 | 47.67 | na | 58.23 | 9.50 | 26.65 |
| 1991 | 0.70 | 59.51 | na | 53.61 | 10.34 | 19.86 |
| 1992 | 1.00 | 51.25 | 2.03 | 47.04 | 4.95 | 15.26 |
| 1993 | 0.65 | 56.31 | 2.16 | 55.57 | 10.40 | 20.28 |
| 1994 | 1.00 | 54.71 | 2.76 | 60.27 | 10.94 | 20.85 |
| 1995 | 0.91 | 48.20 | 2.16 | 48.76 | 13.96 | 21.83 |
| 1996 | 1.16 | 62.81 | 2.49 | 68.58 | 13.65 | 27.60 |
| 1997 | 1.56 | 85.55 | 2.78 | 85.42 | 22.92 | 45.12 |
| 1998 | 1.87 | 83.17 | 2.31 | 84.84 | 21.10 | 41.36 |
| 1999 | 4.11 | 80.27 | 3.10 | 76.55 | 23.50 | 40.27 |
| 2000 | 2.71 | 94.48 | 2.23 | 113.21 | 24.80 | 49.37 |
| 2001 | 1.82 | 135.35 | 3.90 | 81.77 | 26.75 | 57.49 |

**RTA**

| Year | 022.49 | 022.42/43 | 022.41 | 023 | 024 | Total (022,023,024) |
|------|------|------|------|------|------|------|
| 1990 | 0.38 | 47.69 | na | 58.21 | 9.37 | 26.55 |
| 1991 | 0.31 | 59.28 | na | 53.60 | 9.88 | 19.70 |
| 1992 | 0.75 | 51.06 | -1.72 | 47.04 | 4.81 | 15.14 |
| 1993 | 0.45 | 56.29 | -2.50 | 55.57 | 10.26 | 20.17 |
| 1994 | 0.78 | 54.65 | -0.19 | 60.25 | 10.79 | 20.74 |
| 1995 | 0.86 | 48.17 | -1.73 | 48.75 | 13.71 | 21.68 |
| 1996 | 1.05 | 62.77 | -3.56 | 68.55 | 13.32 | 27.34 |
| 1997 | 1.22 | 85.44 | -7.22 | 85.31 | 22.62 | 44.90 |
| 1998 | 1.52 | 83.03 | -4.24 | 84.72 | 20.64 | 41.12 |
| 1999 | 3.10 | 80.09 | -4.56 | 76.43 | 23.23 | 40.05 |
| 2000 | 1.09 | 94.27 | -9.18 | 113.05 | 24.52 | 49.07 |
| 2001 | 0.68 | 135.14 | -8.96 | 81.69 | 26.53 | 57.21 |

**RC**

| Year | 022.49 | 022.42/43 | 022.41 | 023 | 024 | Total (022,023,024) |
|------|------|------|------|------|------|------|
| 1990 | 0.78 | 8.90 | na | 7.85 | 4.25 | 5.67 |
| 1991 | 0.59 | 5.54 | na | 9.56 | 4.20 | 4.83 |
| 1992 | 1.41 | 5.59 | -0.61 | 10.74 | 3.62 | 4.87 |
| 1993 | 1.15 | 8.00 | -0.77 | 10.83 | 4.33 | 5.30 |
| 1994 | 1.51 | 6.96 | -0.06 | 8.66 | 4.28 | 5.30 |
| 1995 | 2.82 | 7.38 | -0.59 | 8.60 | 4.03 | 4.98 |
| 1996 | 2.30 | 7.18 | -0.89 | 7.70 | 3.71 | 4.67 |
| 1997 | 1.53 | 6.64 | -1.28 | 6.68 | 4.32 | 5.30 |
| 1998 | 1.68 | 6.40 | -1.04 | 6.52 | 4.03 | 5.16 |
| 1999 | 1.40 | 6.06 | -0.90 | 6.43 | 4.46 | 5.21 |
| 2000 | 0.51 | 6.11 | -1.63 | 6.55 | 4.48 | 5.10 |
| 2001 | 0.47 | 6.47 | -1.19 | 6.93 | 4.80 | 5.31 |

**Source: Estimated using data from the United Nations, 1990-2001, International Trade Statistics Yearbook and FAO, 1990-2001, FAO Trade Yearbook.**

**Table 5.18: Vollrath's Revealed Competitive Advantage Indexes for Dairy Products: Denmark**

**RXA**

| Year | 022.49 (milk condensed and evaporated) | 022.42/43 (milk dry) | 022.41 (whey preserved and concentrated) | 023 (butter) | 024 (cheese and cure) | 022,023,024 (Total Dairy Products) |
|---|---|---|---|---|---|---|
| 1990 | 0.02 | 5.65 | 6.23 | 6.14 | 9.31 | 6.57 |
| 1991 | 0.04 | 4.60 | 3.10 | 5.16 | 8.47 | 5.71 |
| 1992 | 0.05 | 4.29 | 3.43 | 5.57 | 8.55 | 5.59 |
| 1993 | 0.02 | 4.26 | 2.73 | 4.27 | 9.06 | 5.54 |
| 1994 | 0.10 | 5.30 | 3.09 | 5.56 | 9.47 | 6.25 |
| 1995 | 0.004 | 4.05 | 3.47 | 4.62 | 9.91 | 5.75 |
| 1996 | 0.008 | 4.68 | 3.20 | 5.78 | 9.83 | 6.13 |
| 1997 | 0.01 | 5.04 | 4.16 | 4.36 | 11.29 | 6.55 |
| 1998 | 0.01 | 5.71 | 3.59 | 5.00 | 11.25 | 6.59 |
| 1999 | 0.005 | 4.71 | 3.39 | 5.58 | 11.74 | 6.86 |
| 2000 | 0.005 | 3.94 | 3.03 | 5.98 | 12.24 | 6.97 |
| 2001 | 0.29 | 3.12 | 2.67 | 5.32 | 10.27 | 5.84 |

**RTA**

| Year | 022.49 | 022.42/43 | 022.41 | 023 | 024 | Total (022,023,024) |
|---|---|---|---|---|---|---|
| 1990 | -0.07 | 5.34 | 4.11 | 5.17 | 8.62 | 6.00 |
| 1991 | -0.16 | 4.28 | 1.08 | 3.71 | 7.72 | 5.02 |
| 1992 | -0.11 | 3.96 | 1.66 | 4.66 | 7.83 | 5.00 |
| 1993 | -0.20 | 4.06 | 0.97 | 2.66 | 8.05 | 4.79 |
| 1994 | -0.20 | 5.07 | 1.58 | 4.05 | 8.47 | 5.53 |
| 1995 | -0.07 | 3.81 | 2.28 | 2.39 | 9.05 | 5.00 |
| 1996 | -0.09 | 4.45 | 1.76 | 3.30 | 8.69 | 5.24 |
| 1997 | -0.10 | 4.71 | 2.34 | 1.82 | 10.08 | 5.56 |
| 1998 | -0.08 | 5.51 | 2.46 | 2.99 | 10.18 | 5.77 |
| 1999 | -0.10 | 4.43 | 2.34 | 3.68 | 10.40 | 5.94 |
| 2000 | -0.12 | 3.74 | 1.45 | 3.15 | 10.57 | 5.80 |
| 2001 | 0.06 | 2.93 | 0.74 | 3.23 | 8.60 | 4.67 |

**RC**

| Year | 022.49 | 022.42/43 | 022.41 | 023 | 024 | Total (022,023,024) |
|---|---|---|---|---|---|---|
| 1990 | -1.62 | 2.91 | 1.08 | 1.84 | 2.60 | 2.44 |
| 1991 | -1.52 | 2.66 | 0.43 | 1.27 | 2.41 | 2.11 |
| 1992 | -1.18 | 2.55 | 0.66 | 1.80 | 2.48 | 2.25 |
| 1993 | -2.46 | 3.07 | 0.44 | 0.98 | 2.19 | 1.99 |
| 1994 | -3.09 | 3.11 | 0.72 | 1.30 | 2.25 | 2.16 |
| 1995 | -2.90 | 2.83 | 1.06 | 0.73 | 2.45 | 2.03 |
| 1996 | -2.45 | 2.98 | 0.79 | 0.85 | 2.16 | 1.93 |
| 1997 | -2.50 | 2.73 | 0.83 | 0.54 | 2.23 | 1.87 |
| 1998 | -2.21 | 3.31 | 1.15 | 0.91 | 2.35 | 2.07 |
| 1999 | -3.04 | 2.81 | 1.17 | 1.08 | 2.17 | 2.01 |
| 2000 | -3.29 | 2.99 | 0.65 | 0.75 | 1.99 | 1.79 |
| 2001 | 0.24 | 2.79 | 0.32 | 0.93 | 1.81 | 1.61 |

**Source: Estimated using data from the United Nations, 1990-2001, International Trade Statistics Yearbook and FAO, 1990-2001, FAO Trade Yearbook.**

**Table 5.19: Vollrath's Revealed Competitive Advantage Indexes for Dairy Products: Netherlands**

**RXA**

| Year | 022.49 (Milk condensed and evaporated) | 022.42/43 (Milk dry) | 022.41 (Whey preserved and concentrated) | 023 (Butter) | 024 (Cheese and Cure) | 022,023,024 (Total Dairy Products) |
|------|------|------|------|------|------|------|
| 1990 | 20.91 | 5.31 | 7.07 | 5.79 | 7.33 | 6.38 |
| 1991 | 16.79 | 3.40 | 5.98 | 5.68 | 7.69 | 5.69 |
| 1992 | 15.72 | 3.51 | 5.06 | 6.80 | 8.28 | 5.99 |
| 1993 | 16.70 | 3.74 | 5.51 | 6.96 | 7.45 | 5.84 |
| 1994 | 14.69 | 2.90 | 5.22 | 5.31 | 6.94 | 5.14 |
| 1995 | 11.27 | 3.28 | 4.61 | 4.49 | 6.04 | 4.57 |
| 1996 | 11.07 | 2.77 | 4.12 | 4.55 | 6.23 | 4.58 |
| 1997 | 7.51 | 2.55 | 4.15 | 4.18 | 5.11 | 3.83 |
| 1998 | 7.57 | 2.65 | 4.27 | 4.19 | 4.93 | 3.75 |
| 1999 | 9.10 | 2.88 | 4.06 | 5.04 | 5.11 | 4.11 |
| 2000 | 8.49 | 2.69 | 3.89 | 3.32 | 4.64 | 3.59 |
| 2001 | 7.94 | 2.26 | 3.27 | 4.25 | 4.15 | 3.27 |

**RTA**

| Year | 022.49 | 022.42/43 | 022.41 | 023 | 024 | Total (022,023,024) |
|------|------|------|------|------|------|------|
| 1990 | 16.33 | 1.02 | -3.61 | 2.59 | 6.38 | 3.50 |
| 1991 | 12.42 | -0.32 | -4.23 | 2.12 | 6.61 | 2.86 |
| 1992 | 10.41 | -1.14 | -7.54 | 3.62 | 7.13 | 2.91 |
| 1993 | 13.15 | -0.19 | -5.06 | 2.89 | 6.14 | 3.00 |
| 1994 | 10.00 | -1.32 | -4.91 | 2.72 | 5.74 | 2.42 |
| 1995 | 7.02 | -1.73 | -4.12 | 1.99 | 4.96 | 1.63 |
| 1996 | 6.62 | -0.68 | -4.81 | 2.36 | 5.23 | 2.16 |
| 1997 | 3.14 | -0.94 | -2.53 | 1.58 | 4.24 | 1.58 |
| 1998 | 3.24 | 0.09 | -3.24 | 2.21 | 4.30 | 1.96 |
| 1999 | 3.68 | -0.79 | -3.15 | 2.05 | 4.24 | 1.78 |
| 2000 | 3.25 | -0.53 | -1.94 | 1.10 | 3.75 | 1.57 |
| 2001 | 4.24 | -0.05 | -2.75 | 1.95 | 3.07 | 1.44 |

**RC**

| Year | 022.49 | 022.42/43 | 022.41 | 023 | 024 | Total (022,023,024) |
|------|------|------|------|------|------|------|
| 1990 | 1.52 | 0.21 | -0.41 | 0.59 | 2.04 | 0.80 |
| 1991 | 1.34 | -0.09 | -0.53 | 0.47 | 1.96 | 0.70 |
| 1992 | 1.08 | -0.28 | -0.91 | 0.76 | 1.97 | 0.67 |
| 1993 | 1.55 | -0.05 | -0.65 | 0.54 | 1.74 | 0.72 |
| 1994 | 1.14 | -0.37 | -0.66 | 0.72 | 1.76 | 0.64 |
| 1995 | 0.97 | -0.42 | -0.64 | 0.59 | 1.72 | 0.44 |
| 1996 | 0.91 | -0.22 | -0.77 | 0.73 | 1.82 | 0.64 |
| 1997 | 0.54 | -0.31 | -0.47 | 0.47 | 1.77 | 0.53 |
| 1998 | 0.56 | 0.03 | -0.56 | 0.75 | 2.06 | 0.74 |
| 1999 | 0.52 | -0.24 | -0.57 | 0.52 | 1.77 | 0.57 |
| 2000 | 0.48 | -0.18 | -0.40 | 0.40 | 1.66 | 0.57 |
| 2001 | 0.76 | -0.02 | -0.61 | 0.61 | 1.35 | 0.58 |

**Source: Estimated using data from the United Nations, 1990-2001, International Trade Statistics Yearbook and FAO, 1990-2001, FAO Trade Yearbook**.

# Chapter 6

# Thailand's Demand for Australia's Exports of Dairy Products

## 6.1 Introduction

As the results explained in chapter 5 demonstrate, Australia has comparative advantage in all of the dairy products and is located in close proximity to Thailand, while Thailand has comparative disadvantage in the dairy products, except in milk condensed and evaporated. Australia's dairy product exports to Thailand have increased significantly since 1995 (ADC, 1996). Thailand's domestic production of raw milk was only 30 per cent of its aggregate market requirement in 1997. However, the expectation is that domestic consumption of milk will increase 20 to 25 per cent in litres per person in 2007 (BOI, 2003b). In relation to Thailand's dairy product imports, there are several principal suppliers such as New Zealand, the EU and Australia. Hence, it is important to investigate the determinants of export demand and to analyse the impact of, and estimate elasticities with respect to, relative prices, income and other variables for Thailand's demand for Australia's dairy product exports. Therefore, the objectives of this chapter are to develop and estimate a model of Thailand's demand for Australia's dairy product exports.

The chapter starts with a review of the theory of export demand and its determinants in Section 6.2. A review of empirical studies of the determinants of export demand is presented in Section 6.3. A model of Thailand's demand for Australian dairy exports is developed in Section 6.4. In Section 6.5, the variables used in the econometric analysis, data, as well as source of data are described. Econometric methodology, with emphasis on the analysis of time series properties of data, is explained in Section 6.6. Results of the analysis are presented and discussed in Section 6.7. Conclusions are included in Section 6.8.

## 6.2 Theoretical Background

In theory, the demand for country i' exports of a product is the aggregate demand for that product by all countries to which that product is exported by country i, minus the exports of the product to those countries by the other exporting countries. The assumption is that each importing country represents an insignificant share of the total world market. Individual countries' import demand is the difference between its domestic demand and the domestic supply at the world prices. Hence, a change in importing countries' domestic demand and supply will shift the demand for exports from the exporting countries.

The elasticity of demand for a country's exports of a given product is inversely related to its share in the world market as follows:

$$E_{xd} = [\, Q^w_d / (Q^w_d - Q^r_w)\,] \times E^w_d + [\, Q^r_w / (Q^w_d - Q^r_w)\,] \times \varepsilon^h_s \qquad (6.1)$$

Where $E_{xd}$   = the elasticity of demand for country i's exports,

$\quad Q^w_d$   = the quantity demanded in the world,

$\quad Q^r_w$   = the quantity exported by competing countries,

$\quad E^w_d$   = the elasticity of the world demand,

$\quad \varepsilon^h_s$   = the price elasticity of supply from the other countries.

Kreinin (1991) pointed out that an important implication of the above relation is that even if the world demand for a certain product is relatively inelastic the demand for an individual country's exports of the product can be highly elastic if it has only a small share in total world market.

## 6.3 Review of Literature on the Determinants of Export Demand

Several empirical studies have used an export demand function to construct an estimation based on a single equation model for each product exported. Ball et al (1966) pointed out the effects of variations in internal demand pressure on the UK export performance. As the change of domestic prices and costs relate to demand pressure, there will be an indirect effect on export performance through international price competitiveness. Variations in internal demand pressure may affect export

performance indirectly by affecting the demand for exports. As determinants of the level of exports, they used as explanatory variables, world demand, relative prices and various measures of internal demand pressure, in linear and log linear regressions. Thus, the view is that the movement of world demand as reflected in real world expenditures on exports is highly correlated with the movement of the UK's exports both in the long and in the short run.

Magee and Houthakker (1969) stated that previous studies on the behaviour of exports have tended to ignore the simultaneous relationship between the quantity and the price of exports. He has taken explicit account of this relationship by specifying the models of export demand and supply and by estimating these models simultaneously, using quarterly aggregate export data for eight industrial countries over the period 1955-70. The results indicated that price elasticities of export demand are larger than those obtained previously by other researchers for this group of countries.

Khan (1974) estimated the world demand for several developing country aggregate exports. In the export demand equation, estimated price elasticities are significantly different from zero at the 5 percent level and have the expected negative signs in the equations for countries such as Chile and Costa Rica. The price elasticity for Uruguay is significantly different from zero but has an unexpected positive sign. The implication of this result is that although these countries are primary commodity exports, they do not necessarily face an inelastic demand, and price variations would affect the quantity of exports demanded. The income elasticities are positive and significant in the estimated equation for Argentina. He also found that price elasticities of imports and exports tend to be much larger than would have been expected. He concluded that prices are significant factors in the determination of imports and exports of developing countries.

Donges and Riedel (1977) examined the demand for manufactured exports of less developed countries, in order to determine whether economic policy has had an impact on export performance, albeit on the basis of circumstantial evidence. They also tested whether manufactured exports exhibited shifts in intercept or slope at times relating to policy reorientation. They found that, in 8 out of 12 of the sample countries, there was a direct association between change in economic policy and

change in export performance. Although the exercise provided evidence that economic policy is effective in stimulating export growth, it suggests nothing about which policies have been most effective.

Goldstien and Khan (1978) investigated the price responsiveness of both export demand and export supply using quarterly data on aggregate exports of eight industrial countries for the period 1955-1970. Two relatively simple export demand and supply models were specified and estimated simultaneously so as to eliminate the bias arising from two-way relationship between export quantities and export prices. Khan (1974) and Goldstein and Khan (1978) pointed out that unless export function is subject to constant return to scale, an increase in demand for a country's exports could not be met without generating an increase in the price of exports.

Bond (1985) pointed out that export price changes are associated with the weighted average of the real effective exchange rates of the countries. Moreover, demand for exports may depend on three variables; the real GNP a country, the country's price in the product market relative to country's competitor's prices, and a country's price in the product market relative to domestic price in the country's market. Arize (1987a) highlighted that the estimation of price elasticity of export demand based on a single equation assumes that price elasticity of export supply is infinite. He explained the demand for exports as the world demand for an individual country's product, and export demand depends on the relative price of exports and the real incomes of the importing countries. Riedel (1988) estimated an export demand model and concluded that the results demonstrate a high estimated income elasticity of demand and low estimated price elasticity of demand.

Athukorala (1991) stated that the export demand function is entirely accounted for by four factors (world demand, exchange rate, income, price). He measured these factors separately using specific indices and then used them as explanatory variables in a time series regression model to explain change in real exports of selected developing countries. The coefficient of the world demand variable was statistically significant with the expected sign for all the countries. The world demand is an important determinant of export demand. The elasticity of individual country real exports with respect to changes in world demand varies from 28 per cent for India to 91 per cent

for Malaysia, suggesting a weighted average elasticity coefficient of 62 per cent for the whole sample.

 Muscatelli et al (1992) estimated a demand function for exports of NIEs. They indicated that if one chooses to normalise the demand equation as an export quantity equation, one confirms the results found in most single equation studies of export demand in NIEs, and one finds a high estimated income elasticity of demand and a low estimated price elasticity of demand. If one chooses to normalise the export demand equation as a price equation, the results tend to support the small country assumption. They opted to estimate a simultaneous demand and supply model using the following two-stage procedure. They estimated the long run demand and supply relationships, and construct error-correction terms, using the modified OLS estimator. They presented some new empirical estimates for the demand and supply of exports of manufactures from Hong Kong. The results provide different signs from those obtained in previous studies on Hong Kong. Hong Kong as a small economy would face a low price elasticity of demand for its exports and face demand-constraints in its export markets. The estimated income elasticity of export demand is high, conforming to a pattern found in most fast-growing economies, whether in the developed or the developing world.

Bullock et al. (1993) and Gupta and Ray (1998) highlighted other variables that may affect export demand, for example, exchange rate, trade policy and quality of products. Athukorala and Ridel (1994) pointed out that if the objective were to examine the small country assumption, the restrictions that should have been imposed and tested in the price dependent export demand equation were zero coefficients on export quantity and world income. The results are estimated of the price dependent export demand equation with no restrictions imposed, equation two with a zero coefficient restriction on export quantity and equation three with a zero coefficient restriction on export quantity and world income.

Warr and Wollmer (1996) examined a demand relationship for Philippine's coconut exports, based on Goldstein and Khan (1984) framework. The long run price elasticity of demand for this commodity was estimated at between –1.143 and –2.128. The

small country hypothesis is rejected using the special existence of an optimal export tax for Philippine coconut oil exports.

Gunawardana and Karn (1998) estimated an export demand function for Australian pharmaceuticals, with Australia's export price relative to competing countries' export price and total real income of countries importing pharmaceutical products from Australia as independent variables. They concluded that in the short run, export demand is not responsive to either relative price or foreign income. However, the coefficients for relative price and real income have expected signs and are significant at the 1 per cent level. The long run price elasticity of demand of −1.06 indicates that a 1 percent increase in Australia's export price relative to competitors' export price will result in a 1.06 per cent decline in the real exports of pharmaceuticals by countries that import this product from Australia. The long run income elasticity of 2.56 indicates that, a 1 per cent increase in real income of importing countries will increase the demand for pharmaceuticals exported by Australia by 2.56 per cent. Sawyer and Sprinkle (1999) also concluded that the estimation of the demand for exports relate changes in the quantity of exports to changes in income and relative prices.

Arize (2001) focused on aggregate demand for exports of a number of countries, linking real exports with a measure of foreign real income and relative prices as important elements in trade models. Export demand function is crucial for export forecasts, international trade planning and policy formulation. It is necessary not only to examine whether an export demand function is cointegrated, but also to investigate the stability of such a function in both the short and long run. While the stability of long run export demand relations is of interest, the short run adjustment of real exports to changes in foreign demand conditions and relative prices are important, especially for policy. He supplemented the error correction model (ECM) estimates with, first median time lags for the adjustment of real exports to the independent variables. Evidence on the stability of the short run relations using the Hansen (1992b) test designed for non-trending data. The results indicated the presence of a long run equilibrium relationship among real exports, real world income and prices. To examine the issue relating to the nature of the long run relationships in the data, he started by normalising on real exports and relative price.

Mahmood (2002) estimated the export demand for Australia's processed foods in Japan using the single equation model. He assumed export demand to be a function of a price term, an income term, and the exchange rate. He found that all the price coefficients had expected negative signs, except dairy products for which the price term was insignificant, and therefore omitted. Based on the estimated elasticities, the demand for Australia's processed foods, except dairy products, in Japan is price inelastic, and income elasticity is very high, except for dairy products having income elasticities below one. All of the exchange rate elasticities have expected negative signs and the exchange rate has a significant influence on export demand.

## 6.4 The Model

In this section, Thailand's demand for Australia's exports of dairy products and its determinants are analysed through the estimation of an export demand function for the period 1975-2000.

Following the empirical studies reviewed in the previous section, Thailand's demand function for Australia's dairy product exports is specified as:

$$X^d_{AT} = f\ (P^x_a/P^x_c,\ GDP_T,\ XR_{bht/a},\ DT_T,\ DAC) \tag{6.2}$$

Where

$X^d_{AT}$    = Demand for Australia's dairy product exports in Thailand

$P^x_a$    = Price of dairy product exports of Australia

$P^x_c$    = Average of dairy product export prices of competitor countries
        (New Zealand, Netherlands, Denmark, and Ireland)

$GDP_T$ = Gross domestic product (national income) of Thailand

$XR_{bht/a}$ = Exchange rate of Thai baht against Australian dollar

$DT_T$    = Intercept dummy variable for Thailand's tariffs on imports of dairy products
        (1 for high tariff years (1975-1987; 0 for low tariff years (1988-2000)

$DAC$   = Intercept dummy variable for the effect of Asian financial crisis on dairy
        product imported by Thailand (0 for 1975-1996; 1 for 1997-2000).

In log-log form, the model in equation 6.2 is written as:

$$LX^d_{AT(t)} = \alpha_0 + \alpha_1 L(P^x_a/P^x_c)_{(t)} + \alpha_2 LGDP_{T(t)} + \alpha_3 LXR_{bht/a(t))} + \alpha_4 DT_T + \alpha_5 DAC + \varepsilon_t$$

$$(6.3)$$

Accordingly, $a_1$ will be negative, as an inverse association between the quantity of exports demanded and the relative price of exports is expected. This means that if the relative price of exports increases, Australia's dairy product exports to Thailand will decrease. $a_2$ will be positive, as Thailand's GDP improves the dairy product exports to Thailand are expected to increase. $a_3$ will be negative, as an increase in the exchange rate of Thai baht against the Australian dollar (Thai baht depreciation) will suppress Thailand demand for Australian dairy exports. $a_4$ will be negative, since in the high tariff years in Thailand the demand for Australian dairy exports will be lower. $a_5$ will be negative, since Thailand's demand for Australia's dairy product exports is expected to be lower during the crisis years.

## 6.5 Data and Sources of Data

Economic time series data form the basis of analysis and estimation of Thailand's demand for Australia's exports of dairy products. The data were collected from the Australian Bureau of Statistics (ABS), the Australian Bureau of Agricultural and Resource Economics (ABARE), Dairy Compendium, Annual Reports of Australia's dairy companies published by the Australian Dairy Corporation (ADC), Commodity Statistical Bulletin and Situation and Outlook from the Australian Bureau of Agricultural and Resource Economics, Foreign Trade Statistics of Thailand from the Department of Customs, the United Nations' International database (the UN), Food and Agricultural Organisation (FAO), and dXEcon data.

The classification of the dairy products in two-digit and three-digit numbers is based on the UN and FAO Standard International Trade Classification (SITC). This classification is presented below.

| 02 | Dairy Products |
|----|----------------|
| 022 | milk and cream dry |
| 023 | butter |
| 024 | cheese and curd |

The data for dairy product exports were available from the UN and FAO for the period 1975-2000. Hence, data used in this study are confined to this period. The UN and FAO publications present export data in their current values. For the calculation of the real values of exports, data in current prices based are converted into real values via deflating by the gross domestic product (GDP) deflator.

To calculate the unit price indexes of Australia's dairy product exports, and the weighted average unit price index for Australia's competing countries' exports, we used the quantity (volume) and value ($US) of exports under the SITC framework. The volumes and value of dairy product exports were obtained from the UN International Trade Statistics Yearbook and FAO International Trade Statistics. The data series used in these calculations are given in Appendices 6.1-6.19.

There are seven data series, which are used in the econometric estimation of export demand:

- Australia's real export (value);
- Australia's export price index;
- Average export price indexes for Australia's competing countries;
- Thailand's real GDP;
- Thailand's exchange rate (baht/AUD);
- Dummy variable representing high tariff years ($DT_T = 1$ for 1975-1987) and low tariff years ($DT = 0$ for 1988-2000) of Thailand; and
- Dummy variable representing the Asian financial crisis since mid 1997 (DAC = 0 for 1995-1996; DAC = 1 for 1997 onwards).

## 6.6 Econometric Methodology

## 6.6.1 Non-Stationary Time Series

A time series is a collection of sequential data such that each point of data of the variable is associated with a particular instant in time. The classification of time series as stationary is when the mean, variance and co-variance between any two values of the data series are constant. Non-stationary series exhibit some upward and some downward trends. Time series are often non-stationary in that their trends and other pseudo-systematic characteristics can shift with time. The regressions using non-stationary time series data are known as spurious regressions. Box and Newbold (1971) indicated that we can produce a spurious model if sufficient care is not taken over an appropriate formulation for the autocorrelation structure of the errors from the regression equation. Spurious regressions as misleading least squares regression of time series data will have high $R^2$ values and significant t-statistics, but the relationships are biased and not true (Granger and Newbold, 1974).

The theory of stationary time series is closely related to the characteristics of models with unit roots. For instance, consider the time series $Y_t$, which is generated as the following trend stationary process:

$$Y_t = \gamma + \beta T + \varepsilon_t \tag{6.4}$$

Where, $\gamma$ is a constant, $\beta$ is a coefficient of time trend (T) and $\varepsilon_t$ is the error term. The subscript "t" indicates the time difference of the series (t=1, 2,……n). Alternatively, if the series is in difference form, $Y_t$ is generated by the following process:

$$Y_t = \alpha Y_{t-1} + \varepsilon_t \tag{6.5}$$

Where, $\alpha$ is the autoregrssion coefficient.

There are a number of statistical procedures available in the literature for testing unit roots in time series data, such as the Dickey-Fuller (DF), Augmented Dickey-Fuller (ADF) and Johansen tests. Dickey and Fuller (1979) designed a test for the hypothesis

involving the coefficient with the lag dependent variable, based on the assumption that the error terms are white noise. DF test is on testing the hypothesis in both trend stationary process and difference stationary process, which can be presented as follows:

$$Yt = \alpha_0 + \alpha_1 X + \alpha_2 Y_{t-1} + \mu_t \qquad (6.6)$$

Where $\alpha_0$, $\alpha_1$ and $\alpha_2$ are parameters. When $\alpha_1$ is zero and $\alpha_2$ is one, the regression model can revert to become difference stationary. If $\alpha_2$ is zero, this model will be approached in a form of trend stationary process. The time series $Y_t$ is integrated at order one, I(1), if $\alpha_2$ is one. Based on these conditions, the t-distribution and F-distribution tests are not appropriate for testing the null hypothesis. Hence, the corrected tables of critical values for the asymptotic distribution of the t- and F- statistics are emphasised by Dickey and Fuller (1979).

The ADF test is based on the DF test. However, it is different in some respects. It includes terms of the lagged dependent variable as are significant to success residual whitenoise. The ADF regression can be written as:

$$Yt = \alpha_0 + \alpha_1 X + \alpha_2 Y_{t-1} + \sum_{i=1}^{k} \alpha_1 \Delta Y_{t-1} + \mu_t \qquad (6.7)$$

where, $\Delta Y_t = Y_t - Y_{t-1}$ and $\sum_{i=1}^{k} \alpha_1 \Delta Y_{t-1} = 1$ exhibit the lagged terms,

with the length of the lag structure k. The principle objective in adding these terms to the model is to allow for Autoregressive Moving Average (ARMA) error process and to change the effects of serial correlation in the residuals of the equation. For the statistic of DF and ADF tests the same significant tables can be utilised (Maddala, 1992).

In order to convert non-stationary time series to the stationary form, the process of differences by obtaining the change from one period to the next is applied to the model. If non-stationary series is differenced d times before it becomes stationary, it is to be integrated at order d, as known I (d). The integrated variable is derived from the

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presence of unit roots, that is I (d), or unit roots (Box and Jenkins, 1970; Granger and Newbold, 1974).

## 6.6.2 Cointegration

The concept of cointegration consists of matching up the degree of nonstationarity of the variables in an equation with the residuals of the equation are stationary and does not have spurious results from the regression equation (Studenmund, 2000). For instance, if two variables were cointegrated in economic terms, they would link to each other in the long run. Moreover, cointegration testing of time series is to test if two or more variables are linked in linear combination over time, and to be the cointegrating vectors when the results are I(1), the estimation is obtained by regressing the variables that have a unit root coefficient on the other variables.

Granger (1981) introduced the theory of cointegration when two or more non-stationary time series data have the property of linear combination that is consistent over time. Suppose that each variable, $Y_t$ and $X_t$ is integrated at order 1, or I(1), so that we can write the regression equation as follows:

$$Y_t = \beta X_t + \varepsilon_t \hspace{4cm} (6.8)$$

The variables $Y_t$ and $X_t$ are to be cointegrated if the two series are integrated at the same order, and the cointegrating parameter ($\beta$) must exist such that $Y_t - \beta X_t = \varepsilon_t =$ I(0), or $(1, -\beta)$ as written in terms of the cointegrating vector. This approach suggests that, in the long run, there is an equilibrium relationship between these two cointegrated series as they move closely and do not drift far apart form each other (Engle and Granger, 1987). Engle and Granger (1987) state that the estimation should provide a good approximation to the correct cointegrating vector because vectors are with minimal residual variance and asymptotically all linear combinations of x will have infinite variance except those that are cointegrating vectors.

Stock and Watson (1993) described that the cointegrating relations and the proposed estimators treat the parameters as the short run dynamics process. In many applications, however, the short run dynamics are of independent or even primary

interest. For example, much of the empirical money demand literature has emphasized on the search for a stable short run money demand function. In such case, the efficient estimators can be used in subsequent stages of the analysis by imposing the estimated cointegrating vectors. In terms of cointegration, there are pairs of economic series, such as prices and wages, that may or may not be cointegrated and a decision on this has to be determined by an appropriate theory or an empirical investigation.

### 6.6.3 Engle-Granger (EG) Two-Step Procedure

Engle and Granger (1987) proposed a two-step procedure to test for cointegration. Firstly, the long run relationship is estimated using the ordinary least squares (OLS) regression by regressing $Y_t$ on $X_t$. This is the cointergration regression. Second, testing for cointegration involves regressing the difference terms of Y variable on the difference terms of the X variable and the lagged residuals from the fist-step. These steps are shown below.

$$Y_t = \alpha + \beta X_t + \mu_t \qquad\qquad (6.9.1)$$

And,

$$\Delta Y_t = \gamma + \Delta \delta X_t + \mu_{t-1} + \varepsilon_t \qquad\qquad (6.9.2)$$

If the $\mu_{t-1}$ in equation 6.9.2 is negative and significant, then the cointegrating relationship estimated in equation 6.9.1 will be significant. In addition, Engle and Granger (1987) pointed out other tests for the cointegrating residuals of the regression. DF test can be applied to the residuals from the cointegrating regression by running an auxiliary regression. ADF test is for more dynamics in the DF regressions. The significance of cointegration regression Durbin-Watson statistic (CRDW) is as another test of cointegration. Sagan and Bhagava (1983) started the use of the CRDW statistic for this purpose.

## 6.6.4 Johansen Maximum Likelihood Procedure

Johesen (1988) derived maximum likelihood estimators of the cointegration vectors from an autoregressive likelihood ratio test. The process is supposed to define from a sequence of p-dimensional Gaussian random variables as follows:

$$Y_t = \Pi_1 Y_{t-1} + \ldots\ldots + \Pi_k Y_{t-1} + \gamma_t, \qquad t = 1, 2, \ldots.. \tag{6.10}$$

Where, $\Pi_1$ is a matrix of parameter (NxN), or in the error form as follows:

$$\Delta Y_t = \Gamma_1 \Delta Y_{t-1} + \Gamma_2 \Delta Y_{t-2} \ldots\ldots + \Gamma_k \Delta Y_{t-k} + \gamma_t, \tag{6.11}$$

where, $\Gamma_1 = -I + \Pi_1 + \ldots.. + \Pi_i,$ $\quad I = 1, 2, \ldots t$

If t is the length of the lagged variable in the VAR, the matrix of VAR will have (NxK-1) differences. Johansen (1988) stated that the likelihood ratio test is a function of eigenvalues of the product matrix corresponding to canonical correlations. The test of the linear restrictions relates another set of eigenvalues of a reduced product matrix. The asymptotic distribution of the first test statistic involves an integral of a multivariate Brownian motion with respect to itself and turns out to depend on one parameter, called the dimension of the process and can be tabulated by simulation or approximated by a $X^2$ distribution. The second test statistic is asymptotically distributed as $X^2$ with the proper degrees of freedom. The Johansen procedure involves first estimating the long run relationships between the dependent variable and each of the independent variables in the model using level form of data, and second estimating the short run relationships using difference from of the data in an error correction model.

Hatanaka (1996) comments that a large number of empirical studies in economics has applied the method of Johanson ML, and summarises that the main difficulties that one faces in applying the Johansen method are due to structural changes, not just in the deterministic trends but more seriously in the variance (Hatanaka, 1996). The presentation of this examination could be found, for example, in Harvey (1990), Cathbertson et al (1992), Hall et al (1992), and Hatanaka (1996)

## 6.6.5 Error Correction Model

Sargan (1964) first adopted the error correction model (ECM) in applied econometrics in a model of the UK wage determination. The ECM is based on the fact that there are long run and short run relationship of variables, when two variables are cointegrated. The error correction model is very closely related to the concept of cointegration as the disequilibrium in one period is corrected in the next period.

The ECM with lagged adjustment can be show as follows:

$$\Delta W_t = \rho_0 + \rho_1 \Delta C_t + \rho_2 (W_{t-1} - C_{t-1}) + \sigma_t \tag{6.12}$$

$\Delta$ is the shift of a variable from period t-1 to t. $\rho_0$, $\rho_1$ and $\rho_2$ are the dynamic adjustment coefficients. $(W_{t-1} - C_{t-1})$ exhibits the short run disequilibrium. Thus, the equation is in the short run adjustment. The long run relationships are super-consistent and highly efficient (Stock, 1987: Perman, 1982).

## 6.6.6 Unrestricted Error Correction Model (UECM)

In the absence of cointegration between non-stationary time series, or when the cointegration estimation is not appropriate, the technique of Unrestricted Error Correction modelling (UECM) is used to estimate the short run and long run relationships between the independent and dependent variables in the model. The UECM minimises the possibility of estimating spurious relationships (Cuthbertson et al, 1992; Athukorala and Rajapathirana, 2000). The UECM is known as the LSE approach (see, Hendry, 1995). The UECM procedure starts with a general dynamic model that is overparametised, or in other words, has more lags than necessary. The model is progressively simplified reducing the length of lags until a parsimonious estimation is obtained, based on a series of diagnostic and statistical tests. These tests are serial correlation test, functional form test (Ramsey, 1969) normality test (Jarquea and Bera, 1980) and heteroscedasticity test.

The general form of the UECM is as follows:

$$\Delta Y_t = \alpha_0 + \sum_{i=0}^{n}(\alpha_1 \Delta X_{t-1} + \alpha_2 \Delta Y_{t-1}) + \sum_{i=0}^{n}(\alpha_3 X_{t-1-i} + \alpha_4 Y_{t-1-i}) + \sigma_t \qquad (6.13)$$

Where $\Delta$ is the difference operator and the subscript i is the length of the lagged variables.

The UECM is estimated with different lag lengths for the right hand side variables $\Delta X$, $\Delta Y$, X, Y. The preferred model is selected for each function based on the corresponding diagnostic tests. Long run elasticity of Y with respect to X is calculated, for example, as $-(\alpha_3/ \alpha_4)$. The variables $\alpha_1 \Delta X$ and $\alpha_2 \Delta Y$ show the short run relationships, while $\alpha_3 X$ and $\alpha_4 Y$ show the long run relationships. This approach has been considered to be superior for small samples as it provides a unique insight to short run dynamics and long run relationship in the same model (Cuthbertson et al, 1992). The UCEM has been adopted in a number of studiessince the 1990s, for instance Muscatelli and Hurn (1992), Athukorala and Menon (1994) and Gunawardana et al (1995), and Athukorala and Rajapathirana (2000).

## 6.7 Discussion of Estimation Results

Before estimating the UECM functions of Thailand's demand for Australia' s dairy product exports, the time series data used in demand estimation are tested for unit roots employing Augmented Dickey-Fuller (ADF) tests and the data for the period 1975-2000.  The results of the unit root tests are presented in Table 6.1.

Only the relative export price of butter (LRP23) is *stationary* in its *level form*. The variables that are *non-stationary* in their *level form* are exports of milk dry (LRX22), exports of butter (LRX23), exports of cheese and curd (LRX24), relative export price of milk dry (LRP22), relative export price of cheese and curd (LRX24), Thailand's real GDP (LGDPT) and the Thai bath/AU$ exchange rate (LEXR).  The variables that are *stationary* in their *first difference form* are exports of milk dry ($\Delta$LRX22), exports of cheese and curd ($\Delta$LRX24), relative export price of milk dry ($\Delta$LRP22), relative export price of butter ($\Delta$LRP23), relative export price of cheese and curd ($\Delta$LRX24), and the Thai bath/AU$ exchange rate ($\Delta$LEXR).  The relative export price of butter ($\Delta$LRP23) and Thailand's real GDP ($\Delta$LGDPT) are non-*stationary* in its *first*

*difference form*. These results tend to suggest that not all of the variables in the models are cointegrated either in the level from or their first difference form. It might be tempting to use those stationary first differences of variables in the estimation of relevant models. But this may show short run relationships only, leaving out important long run relationships, which we are reluctant to abandon. Hence, the results of unit root tests reinforce the rationale for using UECM modelling procedure for the estimation of Thailand's demand functions for Australia's dairy product exports.

**Table 6.1: Results of Unit Root Tests**

| Variable | ADF (1) | 95% critical value | Sample period | NOB* | Conclusion |
|----------|---------|--------------------|---------------|------|------------|
| LRX22 | -3.3299 | -3.6119 | 1977-2000 | 24 | Non-stationary |
| ΔLRX22 | -5.0585 | -3.6219 | 1978-2000 | 23 | Stationary |
| LRX23 | -1.4637 | -3.6119 | 1977-2000 | 24 | Non-stationary |
| ΔLRX23 | -3.1967 | -3.6219 | 1978-2000 | 23 | Non-stationary |
| LRX24 | -3.2785 | -3.6119 | 1977-2000 | 24 | Non-stationary |
| ΔLRX24 | -5.7111 | -3.6219 | 1978-2000 | 23 | Stationary |
| LRP22 | -3.0381 | -3.6119 | 1977-2000 | 24 | Non-stationary |
| ΔLRP22 | -3.7643 | -3.6219 | 1978-2000 | 23 | Stationary |
| LRP23 | -4.6369 | -3.6119 | 1977-2000 | 24 | Stationary |
| ΔLRP23 | -6.4836 | -3.6219 | 1978-2000 | 23 | Stationary |
| LRP24 | -2.5598 | -3.6119 | 1977-2000 | 24 | Non-stationary |
| ΔLRP24 | -4.4666 | -3.6219 | 1978-2000 | 23 | Stationary |
| LGDPT | -2.1522 | -3.6119 | 1977-2000 | 24 | Non-stationary |
| ΔLGDPT | -2.6512 | -3.6219 | 1978-2000 | 23 | Non-stationary |
| LEXR | -2.1167 | -3.6119 | 1977-2000 | 24 | Non-stationary |
| ΔLEXR | -3.6639 | -3.6219 | 1978-2000 | 23 | Stationary |

**Notes**: NOB* = Number of observations.

The Dickey-Fuller regressions include an intercept and a linear trend.

"L" denotes logarithm of the variable.

## 6.7.1 Estimated Export Demand Functions

The unrestricted error correction modelling (UECM) procedure is used in this section to estimate short run and long run relationships between the dependent and independent variable in the models of Thailand's demand for Australia's exports of three SITC categories of dairy products, i.e. 022 milk dry (milk powder), 023 butter and 024 cheese and curd. The models are estimated with difference and level terms of the variables and in log-log (double log) functional form. Log-log form is used for the ease of estimation and derivation of long run elasticities. In Tables 6.2, 6.3, and 6.4, the estimated demand functions are presented together with the relevant diagnostic statistics. As the diagnostic statistics show, the estimated models are statistically well performed. Hence, the presence of problems in relation to serial correlation, functional form misspecification, non-normality and heteroscedasticity can be rejected.

## 6.7.1.1 Estimated Export Demand Function for Milk Dry

The estimated export demand function for milk dry (SITC 022) is presented in Table 6.2. The results of the diagnostic tests are satisfactory although the value of the adjusted $R^2$ is not very high. The short run coefficient for the difference term of the relative price of exports of milk dry ($\Delta$LRP22) has the expected negative sign, which is significant. This indicates that in the short run, the quantity of Australia's milk dry exports demanded in Thailand falls when Australia's export price relative to that of competing countries increases. As shown by the positive but insignificant coefficient for $\Delta$LGDPT, in the short run, the quantity of Australia's milk dry exports demanded in Thailand is not responsive to Thailand's real national income.

The long run coefficient for relative price variable (LRP22$_{t-1}$) is negative as expected and significant. This indicates that in the long run, the quantity of Australia's milk dry exports demanded in Thailand declines when Australia's export price relative to that of competing countries' price increases. The long run relative price elasticity of demand of –2.76 indicates that a 1 per cent increase in Australia's export price relative to competitors' export prices, *ceteris paribus*, will result in a 2.76 decrease in the Australia's milk dry exports demanded in Thailand. The less than infinite price elasticity may indicate that Australia has some market power in Thailand in relation to

the exports of its milk dry products. This may be in contrast to "small country assumption, an aspect that warrants further examination in future studies.

The long run coefficient for Thailand's real national income variable ($LGDPT_{t-1}$) is positive as expected but the coefficient is not significant. This indicates that in the long run, the quantity of Australia's milk dry exports demanded in Thailand does not change significantly in response to changes in Thailand's real national income. The coefficient for the dummy variable for import tariffs of Thailand ($DT_T$) has the expected negative sign but it is not significant. Thus, in high tariff years in Thailand, the demand for Australia's milk dry exports do not seem to be significantly different from that in low tariff years in Thailand. However, the coefficient for the dummy variable for the crisis (DAC) has the positive sign contrary to the expectation and the coefficient is not significant. Hence, it appears that Thailand's demand for Australia's milk dry exports during the financial crisis was not significantly different from that in non-crisis years.

**Table 6.2: Estimated UECM of Thailand's Demand Function for Australia's Milk Dry Exports (SITC: 022)**

| Dependent Variable = ΔLRX22 | | | | |
|---|---|---|---|---|
| **Regressor** | **Coefficient** | **t-ratio** | **Long Run Elasticity** | **t-ratio** |
| Constant | 18.59 | 2.38* | - | - |
| ΔLRP22 | -1.54 | -1.81* | - | - |
| ΔLGDPT | 4.48 | 0.96 | - | - |
| LRX22 $_{(t-1)}$ | -0.94 | -4.58*** | - | - |
| LRP22$_{(t-1)}$ | -2.59 | -2.42** | -2.75 | -2.67*** |
| LGDPT$_{(t-1)}$ | 1.09 | 1.61 | - | - |
| DT$_T$ | -0.72 | -1.13 | - | - |
| DAC | 0.80 | 1.42 | - | - |
| $R^2 = 0.59$    Adj. $R^2 = 0.41$     DW = 1.64 | | | | |
| LMS F $_{(1,16)} = 1.88$     RESET F $_{(1,16)} = 2.60$ <br> JBN, $\chi^2 (2) = 0.05$     HSC F $_{(1,23)} = 0.02$ | | | | |

*** significant at the 1% level, ** significant at the 5% level, * significant at the 10% level.

LMS    = Lagrange multiplier test for serial correlation,

RESET = Ramsey's test functional form using the square of the fitted values,

JBN    = Jarques-Bera test for the normality of residuals (based on $\chi^2$ distribution),

HSC    = Heteroscedasticity test based on the regression of squared residuals on squared

         fitted values.

(The degrees of freedom are given in parentheses).

## 6.7.1.2 Estimated Export Demand Function for Butter

The estimated export demand function for butter (SITC 023) is presented in Table 6.3. The results of the diagnostic tests are satisfactory with a reasonable value of the adjusted $R^2$. The short run coefficient for the difference term of the relative price of exports of butter ($\Delta$LRP23) has the expected negative sign, which is significant. This indicates that in the short run, the quantity of Australia's butter exports demanded in Thailand falls when Australia's export price relative to that of competing countries increases. As shown by the negative but insignificant coefficient for $\Delta$LGDPT, in the short run, the quantity of Australia's butter exports demanded in Thailand is not responsive to Thailand's real national income. The coefficient for Thai baht/AU$ exchange rate ($\Delta$LEXR) is negative as expected and significant. This indicates that in the short run, the quantity of Australia's butter exports demanded in Thailand declines when the Thai baht depreciates against the Australian dollar (or, when AU$ appreciates against the bath).

The long run coefficient for relative price variable (LRP23$_{t-1}$) is negative as expected and significant. This indicates that in the long run, the quantity of Australia's butter exports demanded in Thailand decreases when Australia's export price relative to that of competing countries' price increases. The long run relative price elasticity of demand of $-1.13$ indicates that a 1 per cent increase in Australia's export price relative to competitors' export prices, *ceteris paribus*, will result in a 1.13 decrease in the Australia's butter exports demanded in Thailand. The less than infinite price elasticity may indicate that Australia has some market power in Thailand in relation to the exports of its butter. This may also be in contrast to "small country assumption, an aspect that can be investigated further in future studies.

The long run coefficient for Thailand's real national income variable (LGDPT$_{t-1}$) is positive as expected but the coefficient is not significant. This indicates that in the long run, the quantity of Australia's butter exports demanded in Thailand does not change significantly in response to changes in Thailand's real national income. The long run coefficient for relative exchange rate variable (LEXR$_{t-1}$) is negative as expected and significant. This indicates that in the long run, the quantity of Australia's butter exports demanded in Thailand declines when the Thai baht depreciates against

the Australian dollar (or, when AU$ appreciates against the bath). The long run exchange rate elasticity of demand of –6.34 indicates that a 1 per cent depreciation of Thai bath against the AU$, *ceteris paribus*, will result in a 6.34 decrease in the Australia's butter exports demanded in Thailand.

The coefficient for the dummy variable for import tariffs of Thailand ($DT_T$) has the unexpected positive sign but it is not significant. Thus, in high tariff years in Thailand, the demand for Australia's butter exports do not seem to be significantly different from that in low tariff years Thailand. The coefficient for the dummy variable for the crisis (DAC) also has the positive sign contrary to the expectation and the coefficient is not significant. Hence, it appears that Thailand's demand for Australia's butter exports during the financial crisis was not significantly different from that in non-crisis years.

**Table 6.3: Estimated UECM of Thailand's Demand Function for Australia's Butter Exports (SITC: 023)**

| Dependent Variable = DLRX23 | | | | |
|---|---|---|---|---|
| **Regressor** | **Coefficient** | **t-ratio** | **Long Run Elasticity** | **t-ratio** |
| Constant | 26.36 | 2.02* | - | - |
| $\Delta$LRP23 | -0.68 | -2.24** | - | - |
| LGDPT | -0.11 | -0.03 | - | - |
| $\Delta$LEXR | -5.73 | -2.15** | | |
| LRX23 $_{(t-1)}$ | -0.92 | -3.77*** | - | - |
| LRP23$_{(t-1)}$ | -1.04 | -2.48** | -1.13 | -2.33** |
| LGDPT$_{(t-1)}$ | 1.18 | 1.36 | 1.28 | 1.49 |
| LEXR$_{(t-1)}$ | -5.85 | -2.13** | -6.34 | -3.25*** |
| DT$_T$ | 0.80 | 1.26 | - | - |
| DAC | 1.15 | 1.60 | - | - |
| $R^2 = 0.70$    Adj. $R^2 = 0.53$    DW = 2.17 | | | | |
| LMF F $_{(1,14)}$ = 0.45    RESET F $_{(1,14)}$ = 8.29<br>JBN, $\chi^2$ (2) = 0.78        HSC F $_{(1,23)}$ = 0.24 | | | | |

*** significant at the 1% level, ** significant at the 5% level, * significant at the 10% level.

LMS    = Lagrange multiplier test for serial correlation,

RESET = Ramsey's test for functional form using the square of the fitted values,

JBN    = Jarques-Bera test for the normality of residuals (based on $\chi^2$ distribution),

HSC    = Heteroscedasticity test based on the regression of squared residuals on squared
            fitted values.

The degrees of freedom are given in parentheses.

## 6.7.3 Estimated Export Demand Function for Cheese and Curd

The estimated export demand function for cheese and curd (SITC 024) is presented in Table 6.4. The results of the diagnostic tests are satisfactory although the value of the adjusted $R^2$ is fairly low. This estimated function is relatively poor in that only two of the significant coefficients being derived. The low explanatory power is a result of the exclusion of the exchange rate variable and the dummy variables for Thailand's tariffs and the Asian currency crisis. An estimation with these variables resulted in none of the coefficients being significant.

The short run coefficients for the difference terms of the relative price of exports of cheese and curd ($\Delta$LRP24) and Thailand's real national income ($\Delta$LGDPT) have the expected signs, but they are not significant. This indicates that in the short run, the quantity of Australia's cheese and curd exports demanded in Thailand is not responsive either to the relative price of exports or to Thailand's real national income.

The long run coefficient for Thailand's real national income variable (LGDPT$_{t-1}$) is positive as expected and the coefficient is significant. This indicates that in the long run, the quantity of Australia's cheese and curd exports demanded in Thailand changes significantly in response to changes in Thailand's real national income. The long run income elasticity of demand of 1.84 indicates that a 1 per cent increase in Thailand's real GDP, *ceteris paribus*, will result in a 1.84 increase in Australia's cheese and curd exports demanded in Thailand. This further suggests that Australian cheese and curd is regarded as something of a "luxury" in Thailand.

**Table 6.4: Estimated UECM of Thailand's Demand Function for Australia's Cheese and Curd Exports (SITC: 024)**

| Dependent Variable = DLRX24 | | | | |
|---|---|---|---|---|
| **Regressor** | **Coefficient** | **t-ratio** | **Long Run Elasticity** | **t-ratio** |
| Constant | -1.35 | -0.28 | - | - |
| $\Delta LRP24_{(t-1)}$ | -1.02 | -1.35 | - | - |
| $\Delta LGDPT$ | 0.59 | 0.30 | - | - |
| $LRX24_{(t-1)}$ | -0.56 | -2.73** | - | - |
| $LRP22_{(t-2)}$ | 0.12 | 0.14 | - | - |
| $LGDPT_{(t-1)}$ | 1.04 | 2.34** | 1.84 | 5.17 *** |
| $R^2 = 0.41$    Adj. $R^2 = 0.23$   DW = 1.87 | | | | |
| LMF F$_{(1,15)}$ = 0.05     RESET F$_{(1,15)}$ = 1.08  JBN, $\chi^2 (2)$ = 1.10        HSC F$_{(1,20)}$ = 1.29 | | | | |

*** significant at the 1% level, ** significant at the 5% level, * significant at the 10% level.

LMS    = Lagrange multiplier test for serial correlation,

RESET = Ramsey's test using the square of the fitted values,

JBN    = Jarques-Bera test for the normality of residuals (based on $\chi^2$ distribution),

HSC    = Heteroscedasticity test based on the regression of squared residuals on squared fitted values.

The degrees of freedom are given in parentheses.

## 6.8 Conclusion

Econometric models of Thailand's demand for Australia's dairy product exports, specifically for milk dry, butter, and cheese and curd exports, were developed and estimated in this chapter. The unrestricted error correction modelling (UECM) procedure was employed to estimate the models of export demand.

The findings indicate that in the short run, the quantity of Australia's milk dry exports demanded in Thailand falls when Australia's export price relative to that of competing countries increases, while it is not responsive to Thailand's real national income. In the long run, the quantity of Australia's milk dry exports demanded in Thailand declines when Australia's export price relative to that of competing countries' price increases. The estimated long run relative price elasticity of export demand for milk dry is -2.76. The less than infinite price elasticity may indicate that Australia has some market power in Thailand in relation to the exports of its milk dry products, an aspect worthy of further examination in future studies. In the long run, the quantity of Australia's milk dry exports demanded in Thailand does not change significantly in response to changes in Thailand's real national income.

In the short run, the quantity of Australia's butter exports demanded in Thailand falls when Australia's export price relative to that of competing countries increases, but it is not responsive to Thailand's real national income. The quantity of Australia's butter exports demanded in Thailand declines when the Thai baht depreciates against the Australian dollar (or, when AU$ appreciates against the baht). In the long run, the quantity of Australia's butter exports demanded in Thailand decreases when Australia's export price relative to that of competing countries' price increases. The estimated long run relative price elasticity of demand is −1.13. The less than infinite price elasticity may indicate that Australia has some market power in Thailand in relation to the exports of its butter. This aspect that can also be investigated further in future studies. In the long run, the quantity of Australia's butter exports demanded in Thailand does not change significantly in response to changes in Thailand's real national income. The quantity of Australia's butter exports demanded in Thailand declines when the Thai baht depreciates against the Australian dollar (or, when AU$

appreciates against the bath). The estimated long run exchange rate elasticity of demand is –6.34.

In the short run, the quantity of Australia's cheese and curd exports demanded in Thailand is not responsive either to the relative price of exports or to Thailand's real national income. In the long run the quantity of Australia's cheese and curd exports demanded in Thailand changes significantly in response to changes in Thailand's real national income. The estimated long run income elasticity of demand is 1.84.

The results also indicate that in high tariff years in Thailand as well as in the Asian financial crisis years, Thailand's demand for Australia's exports of any of the dairy products considered is not significantly different from that in other years.

The findings of this chapter can be used to explain the relationship between various macro level determinants (relative price, real income, exchange rate) and Thailand's demand for Australia's dairy product exports. In chapter 7, the findings from interviews with export managers in several Australian companies that export dairy products to Thailand will be presented in order to explore micro (firm or company) level information on the experiences and problems faced by the firms (companies) in the Thai market. This information will be used only as a supplement to the analysis in Chapter 6.

# Chapter 7

# Experience of Some Australian Companies Exporting Dairy Products to Thailand

## 7.1 Introduction

The objective of this chapter is to provide qualitative information, which supplements econometric modelling of Thailand's demand for Australia's Dairy Product Exports in chapter 6. This chapter focuses on the factors influencing the exports of dairy products to Thailand by selected Australian companies. The findings of this chapter are expected to provide information for Australia's dairy product exporters to improve their market opportunities in Thailand.

The interviews with the export managers of selected Australian companies focused on the following aspects: i) trends of and opportunities for Australia's dairy exports to Thailand, ii) factors influencing dairy product exports to Thailand, iii) experience of and problems encountered by the exporting companies, iv) expected exporting opportunities under the FTA framework, v) strengths and weaknesses of Australian dairy product exports in the Thai market, and the main competitors for Australia for dairy product exports in the Thai market.

The remainder of this chapter is organised as follows: the qualitative research method used in this study is discussed in Section 7.2. Selection of companies and ethical considerations are discussed in Section 7.3. Finding from the interviews are presented in Section 7.4. Conclusion is in Section 7.5.

## 7.2 Qualitative Research Method used in this Study

Qualitative research is also known as 'naturalistic inquiry' (Lincoln and Guba, 1985). Generally, the conditions of inquiry are natural and are accepted as they are discovered. The principal aim of qualitative research is to find an idea, which would form new knowledge (Sherman and Webb, 1988). Qualitative research is utilised in the expansion of knowledge, the classification of the real issue, the increased understanding of the research topic and creation of hypotheses. There are three

characteristics of qualitative research (Ezzy, 2002). First, qualitative research is involved with process rather than outcomes as products. Second, qualitative research examines how people make sense of their lives, what they experience, and how they explain these experiences. Third, qualitative research cannot be over emphasised. It focuses on the primary instrument for data collection and analysis. Finally, qualitative research involves fieldwork. For example, it concerns the people setting, site, and institution in order to make the observation as the data collection technique. The principle of qualitative method also establishes dialogue between ideas and observation, between theory and data, and between interpretation and action (Ezzy, 2002).

Brenner et al (1985) state that the qualitative research understands respondents as people, thus the phenomenological approach. In particular, the research attempts to see the world from respondents' perspectives that are likely to give a better understanding of the every day experiences of different people. The basics of qualitative methods have two classifications. These are the group discussion and the interviews (Gordon and Langmaid, 1993).

Respondents could be selected in such a way that they are likely to have answers to the questions (Gordon and Langmaid, 1993). The interview is selected as the research method because it provides the opportunities to get more feedback from respondents and receive a high response rate (Zikmund, 1997). The interviews may be conducted face to face, door to door or over the telephone. It can be structured and unstructured. In structured interviews, interviewers could ask questions directly from the respondents.

As interviews are used as the research method, the objective of data collection must be to obtain valid information from those questioned. Informants are expected to answer questions truthfully, while meeting with precision the special requirements for information posed by the various question embedded in a social situation. Hence, we can never assume that the accounts given are simply answers to questions. They are the joint product of the questions as perceived by information and the social situational circumstances within the questions were put to them.

## 7.3 Selection of Companies and Ethical Considerations

In relation to interviews used in this study, export managers who are involved in the export of Australia's dairy product to Thailand were chosen as respondents because it was expected that they have the experience and perspectives and will provide practical information about Australia's exports of dairy products to the Thai market. The interviews were focused on the factors influencing the companies' dairy product exports to Thailand. The results of the interviews are expected to provide a greater understanding of such factors, and help the decision makers of exporting companies in Australia, which export dairy products to the Thai market.

Questionnaires with some structured and some open-ended questions were selected as the instrument for collecting information through the interviews. The objectives of the interviews were to obtain the following specific information: i) volumes of each company's dairy product exports to Thailand, ii) important factors influencing Australia's dairy products exports to Thailand, iii) experiences and the problems encountered in the Thai market, iv) Australia's expected exports performance of dairy products in Thailand after the implementation of Australia-Thailand Free Trade Agreement (FTA) starting from January 2005, v) opportunities for Australia's dairy products in the Thai market, vi) the expectations about the dairy exports in the future, vii) Australia's strengths and weaknesses in s dairy product exports to Thailand, and viii) the main competitors for Australian companies in the Thai market.

Export managers of four Australian exporting companies exporting dairy products to Thailand granted permission for the interviews with persons in charge of Australian dairy product exports to the Thai market. Four Australian companies were selected for interviews at random from the 30 companies exporting dairy products given in the Australian government's website. The selected companies are as follows:

- Murray Goulbun Co-Perative Co. Ltd.
- Australian Dairy Cooperation (ADC).
- Ausfine Food International Pty. Ltd.
- Toronto Lanne Co. Ltd.

These companies represent both small and large companies. The main criterion to select the four companies was their significant exports of dairy products to Thailand.

The questionnaires were approved by the Human Research Ethics Committee of Victoria University to conserve the safety, liberty and rights of respondents before conducting the interviews. The approval was granted on 28 December 2004 (see Appendix 1).

Interviews had to be conducted with the interviewees' consent. Before conducting the interviews, the objectives of the study and the ethical rules were explained to participants. Each participant was requested to sign the consent form (See Appendix 2) before starting the interviews.

## 7.4 Discussion of Findings from the Interviews

This section discusses the results gathered from the interviewers in regard to practical experiences and perspectives of Australia's companies exporting dairy products to Thailand. In particular, Thailand is one of the major markets in South East Asia for Australia's dairy product exports. Therefore, the aims of the interviews are to find out the key factors influencing Australia's dairy product exports to the Thai market.

## 7.4.1 The Volumes of Dairy Products Exports to Thailand

All respondents agreed that Thailand is a significant market for Australia's dairy product exports and especially from South East Asian countries. Since 1995, Australia's dairy product exports have grown significantly in the Thai market. All the companies have tried to expand their market share in other countries apart from Asian countries. They have also exported to Japan, China, the Philippines and Vietnam. Australia's exports of dairy products have increased to Asian countries, including Thailand where there is strong economic growth. In addition, all the major dairy products have been exported to Thailand, including skim milk powder (SMP), whole milk powder (WMP), whey powder, anhydrous (AMF), cheese and butter. The largest volume of exports to Thailand is SMP. At the moment, it is also the most difficult product to export to Thailand. The Uruguay Round trade liberalisation measures have been in operation since 1995. Thailand has had quotas on SMP. WMP is the second

major export that has been growing. Thailand is also an important market for AMF and SMP, which are closely linked, as they are both used in the dairy processing industry of Thailand. All the respondents also agreed that Thailand's demand of dairy products is still increasing.

This is an example of one company that exports to Thailand every year: Murray Goulburn has a record that this company exported between 1996-2001 about 10,000 tonnes of SMP, but now it is only 2,000 tonnes. Exports of WMP were 1,000 tonnes but it has increased to 3,000 tonnes. Whey powder and cheese exports are at 2,000 tonnes and 400 tonnes, respectively. In cheese, Australian companies find it hard to get in the Thai market because there is production in Thailand.

## 7.4.2 Successful Dairy Products in the Thai Market

In the Thai market, the milk powders are the most successful for Australia's exports, i.e. SMP and whey powder. WMP is also one of the principle products that have increased exports substantially. For SMP, there is an industry in Thailand for producing condensed milk into cans, so that a lot of SMP goes to these manufacturers, and in history, one company has exported SMP to Thailand at 2,000-3,000 tonnes a year. In addition, Australia's AMF exports to Thailand are for reconstitution, which are basically for making butter.

These products have been successful in the Thai market for several reasons. Australia has good quality products. Moreover, price is the most significant factor to distinguish the achievement of Australia's dairy products compared to competitors in the Thai market. Importantly, price is a principle competitive tool in meeting and beating rivals and substitutes. Historically, the Australian price has been competitive, but now with Europe starting to export, usually their price is a little more competitive than Australian price. Two of the respondents agreed that Australia's reputation of dairy products as "clean, green and healthy". Australia's dairy products have a reputation for quality in South East Asia. It is generally known that Australia's products are natural, clean and green. However, the countries that presently export dairy products to Thailand cannot meet Thailand's requirements of dairy products.

Thailand's milk "recombining" industry is starting to sell more products into the bakery sector in Thailand, and one company makes a special product as a blend of SMP, WMP, and whey powder. On the other hand, cheese has greater potential to export because the demand for this product in domestic market is growing gradually. But Thai tariffs have been the main problem at 60 per cent since 1995, although it was reduced to 30 per cent recently. This makes cheese to have a small market in Thailand. However, under the free trade agreement (FTA), there are special safeguards on cheese, and therefore, Australia will not really get access to cheese market in Thailand until 2015.

A clean environment is a very important factor for all the dairy products. It will be more significant in the future as Thai consumers are becoming more concerned with food safety. Product varieties need tailoring to meet special needs. Butter has limited potential to export due to the increasing Thai local production concerned with food safety. However, distribution of butter in Thailand is difficult, and foreign companies have to join with local distributors.

## 7.4.3 Significant Factors Influencing the Decision to Export Dairy Products to Thailand

Thailand has had one of the most stable political and economic environments compared to Cambodia and Vietnam in South East Asia since the late 1970s. Thailand is in some ways an easy place to do business. Moreover, manufacturers of dairy products would look at Thailand because the country has a well-established market and a large population familiar with dairy products.

## 7.4.4 Experience and Problems Encountered in the Thai Market.

Despite Thailand being an attractive market for Australian dairy exporters, the respondents identified a variety of problems. The FDA (Food and Drug Administration) has restrictions on product labelling. With the growth of Thailand's economy, the regulations are being raised. In particular, Thailand's government supports the local dairy industry in a big way and this point has translated into making it difficult to export dairy products to Thailand. Due to the strong protection of the domestic dairy industry, Thailand is one of the countries where the market is difficult

to access. In the past, Thailand has had large requirements for SMP from the manufacturers based in Thailand. But in recent times, Australia's dairy product exports in SMP to Thailand have dropped. Two significant factors that reduce Australia's exports were mentioned: i) manufactures sell direct to end users in Thailand, ii) the product registration system in Thailand has made it difficult for Australian companies to sell some of the products. These problems are legal aspects because Australia's exporters need to register the products in Thailand. This process takes time around one year.

In addition, the Thai government states that the quota is 55,000 tonnes for the whole of Australia's exports per year. However, in the last year (2003) the Thai government allowed a quota of 70,000 tonnes for Australia to export to Thailand. The problem is that the exporters cannot make a production plan because the quotas are issued three or more times a year. Exchange rates have also been a problem especially with the strong depreciation of the baht during 1997-1998 that made Australia's diary products relatively more expensive.

## 7.4.5 Support from the Australian Dairy Cooperation (ADC) and the Australian Government to Australian Dairy Exporters

As revealed during the interviews, the ADC does not do much promotion in Thailand now because it has done so in the past. There is not much reason to promote Australian dairy products in Thailand because most of the products are not sold as "Australian" products. The promotion to persuade Thai consumers is not useful. The ADC has done some promotions in the past at food expos at five star hotels or trade shows, but it stopped doing that 5 or 6 years ago because it was unsuccessful.

On the other hand, the help of the ADC and the Australian government is for the suggestion of a first step towards exports in the Thai market. This was important at the beginning, if a company had no idea at all about Thailand and wanted to export dairy product to that market. For example, what types of dairy products should be exported, what is it about the Thai market or at what target should it focus.

### 7.4.6 Principle Exporting Countries that Compete with Australia in the Thai Market.

New Zealand and the EU are the principle competitors of Australia in the Thai market. As one of the main markets in South East Asia, however, Thailand has 75-80 per cent of dairy product imports from New Zealand and the EU. Australia is still following these countries, which are major suppliers for Thailand. In the world market, the main exporting countries are New Zealand and the EU countries such as Netherlands, France, and Ireland.

New Zealand has one exporter, Kanlerra, which used to be the old New Zealand Dairy Board. New Zealand and Australia produce similar quality milk. But, New Zealand exports a lot more of dairy products than Australia. In fact, Australia exports around 1 million tonnes per year, while New Zealand exports over 2 million tonnes per year. Thus, New Zealand exports more than Australia to both Thailand and the world market.

Moreover, the European exports are heavily subsidised. As an example, actual cost of production per tonne of SMP in the EU might be about $US 5,000, but the actual cost of milk production in Australia might be around $US 2,000. Thus, Australia's milk powder is much cheaper but the EU government subsidies to bring their export price to a lower level. This impacts directly on Australia's dairy product exports to both Thailand and other importing countries.

### 7.4.7 Australia's Strengths and Weaknesses in Dairy Product Exports to Thailand

There are several viewpoints expressed by the respondents about Australia's strengths and weaknesses in dairy industry and its products.[3] One of the strengths is that Australia has low cost of milk production. Australia and New Zealand have similar low costs that are lower than those of the EU or the USA. In terms of price Australia's dairy products are competitive in the Thai market. The comments also emphasised the environment of Australia's milk production, which is clean environment of products, while the EU had the mad-cow disease. The better quality of Australian products

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[3] Note that these may overlap with those expressed in section 7.4.2.

derives a competitive advantage for Australia compared to the competitors. This makes Australian products attractive as well as interesting for Thai customers.

In contrast, Australia has a weakness in product varieties and distribution channels. Australia does not have a lot of dairy product varieties in the Thai market compared to New Zealand and the EU. New Zealand has expanded its exports joint ventures with local companies. This factor can make New Zealand to have the highest market share in Thailand.

## 7.4.8 Opportunities for Australian Dairy Products in the Thai Market in Light of the FTA

Australia and Thailand cooperated to form the FTA in 2004 (Australian Financial Review, 2004). In consequence, the FTA between Australia-Thailand started to operate from January 2005. Both countries would expect to benefit from each other in many industries. In particular, the dairy industry in which Australia has comparative advantage is the principle products to export in high volumes to Thailand. Australia expects that Thailand will reduce its high tariffs on dairy products. More importantly, Thai import quotas will increase for Australia's dairy products. All the respondents had positive opinions with regard to Australia-Thailand FTA as far as improved export opportunities for Australian dairy products in the Thai market are concerned.

The FTA will be good for Australia in that it will enable Australian companies to export more dairy products to Thailand and it will overcome the trade barriers. International trade has been restricted by government policy of Thailand so doing away with those policies will be beneficial and in particular, many Australian companies are looking forward to exporting opportunities. However, the volumes of dairy products involved in the FTA are limited and small. It is not that Australian companies can export everything that they want to.

In principle, the main advantage of the FTA between Australia and Thailand is that both countries will have free trade. But in respondents' opinion, it will take up to 20 years for SMP, 10 years for cheese, and 5 years for a lot of other products to have such free trade. However, there is going to be some advantage in value added

products. Cheese will have a great opportunity in Thailand as a result of the expansion of a much larger cheese market there. But the Australian dairy producers will have to understand that they will have to approach the companies in Thailand and ask exactly what they want. Increasingly, dairy products are being sold as ingredients. For example, Thailand dairy companies process milk powder needed for bread making in Thailand.

## 7.5 Conclusion

This chapter was concerned with presenting the findings from interviews with export managers of four Australian companies that export dairy products to Thailand with regard to their experiences and problems encountered in the Thai market. The respondents' views as expressed during the interviews are summarized below. Thailand is a significant importer of Australia's dairy products, particularly for SMP, WMP, Whey powder, butter and cheese. Thailand's stable economic and political environment is one of the reasons that they are attracted to the Thai market. They view Thailand as a generally good country to business. The volumes of Australia's dairy product exports are around 50,000 to 70,000 tonnes as per Thai import quotas each year. The principal factors that make Australia's products successful in the Thai market are competitive price and clean, green and natural products. These include good quality that is higher than the products of Australia's competitors such as New Zealand and the EU. These factors are the principle strengths of Australia to compete with other competitors in both the world market and the Thai market. However, Australia has some weaknesses in relation to dairy products in the Thai market. Limited Australian product varieties and distribution channels are major factors that contribute to Australia falling behind New Zealand and the EU in the Thai market. The ADC is not involved in promoting Australian dairy products in the Thai market at present, but has done so in the past. The ADC and the Australian government have helped Australian dairy exporters at the initial stages of exporting to Thailand by providing the necessary information about the Thai market.

Thailand has still comprehensive tariff and import quota protection and support to local dairying industry. This is one of the barriers encountered by Australia's exports to Thailand. For instance, the Thai government uses import quotas and high tariffs for

general dairy products such as SMP, WMP, and butter. Australia and Thailand signed a free trade agreement (FTA) in 2004. Under the FTA, it is expected that the Thai government will increase quotas and decrease tariffs for Australia's exports of dairy products to Thailand. All the respondents are hopeful of expanding opportunities for their dairy exports in the Thai market.

The concluding chapter (Chapter 8) presents a summary of the development of the study, the key research findings and policy inferences, limitations of the study and some suggestions for further research.

# Chapter 8
# Summary and Conclusions

## 8.1 Introduction

The purpose of this chapter is to draw conclusions from the finding of the analyses of the preceding chapters of the thesis, in relation to factors influencing Australia's dairy products exports to Thailand. This chapter is organised as follows: Section 8.2 summarises the development of the study. Section 8.3 presents the principle findings and their implications for Australian dairy export companies and policy makers. Limitations of the study are discussed in Section 8.4. Some suggestions for further research are presented in Section 8.5.

## 8.2 Development of the Study

Chapter 1 of the thesis was concerned with outlining the context of research, the specification of the research problem, and objectives and significance of research. In chapter 2, Thailand's economic context was reviewed first, followed by a description of historical aspects of Thailand's dairy sector. Trends in and policies toward dairy product production and consumption in Thailand, and the details of the trends and issues in Thailand's imports and exports of dairy products were discussed next.

Chapter 3 reviewed Thailand's trade policies in relation to dairy product imports. After a discussion of historical development of Thailand's trade policy, Thailand under GATT was reviewed including Thailand's dairy industry and policy under the framework of GATT. An overview of Thailand in the context of WTO, and in particular Thailand's dairy industry and WTO were also provided. Chapter 4 discussed Australia's exports of dairy products with special reference to Thailand. Australia's dairy production and trends in Australia's dairy product exports in general to South East Asia, Middle East and Americas were examined. Australia's exports of dairy products to Thailand were described, in particular in the context of Australia - Thailand, economic relationships and the free trade agreement (FTA).

Chapter 5 presented an analysis of Australia's comparative advantage in dairy products compared to that of Thailand and other countries exporting to Thailand. After reviewing the theories of comparative advantage, comparative advantage in dairy products of Australia and Thailand was investigated using the empirical measurements of trade specialisaton index (TSI), export propensity index (EPI), import penetration ratio (MP), and export/import ratio (EIR. Balassa's index of revealed comparative advantage (RCA) was then derived for dairy products of Australia, Thailand and a number of other exporting countries. Vollrath's indexes of revealed competitiveness were calculated to identify the competitiveness of dairy products in Australia, Thailand and other exporting countries in the world market.

Thailand's demand for Australia's exports of dairy products was examined in Chapter 6. The purpose of this analysis was to identify macro-level determinants of the demand. The chapter first provided theoretical background and a literature review of the determinants of export demand in order to build the conceptual framework for analysis. The models of Thailand's demand for Australia's dairy product (milk dry, butter, cheese and curd) exports were then developed and hypotheses specified. Time-series econometric methodology was reviewed before selecting a suitable modelling and estimation procedure. The models were estimated econometrically, using the unrestricted error correction modelling (UECM) procedure. The short run and long run relationships between the dependent and independent variables were identified, and price, income and exchange rate elasticities were estimated.

Chapter 7 presented the results of interviews with export managers of selected Australian dairy export companies that export dairy products to Thailand. It discussed experiences of and problems encountered by Australian dairy product exporters when they export to Thailand. The discussion of the results of the interviews was to identify micro (firm) level factors influencing Australia's exports of dairy products to Thailand that supplement the findings from econometric modelling in chapter 6.

## 8.3 Conclusions and policy implications

Australia exports dairy products to Thailand, and in particular, SMP, WMP, butter, cheese and curd and whey products. SMP is the principle ingredient of Thailand's milk processing industry. Australia's main competitors in Thailand for exports of dairy products are New Zealand, the EU and to some extent the U.S.A.

Thailand's dairy product imports could be classified into five major categories: milk condensed and evaporated, milk dry, cheese, butter, and whey products. Thailand's dairy imports and domestic products are repackaged and offered for export sale.

Thailand has heavily protected its local dairy industry by high tariffs, quotas and regulation. In strategic plans, the Thai government promoted its dairy production and the use of local milk products. Hence, Australia's dairy product exports have been affected directly by Thai trade barriers leading to declining volumes of Australian dairy exports to Thailand.

In 1982, Thailand became a member of GATT. The Thai government followed GATT rules to reduce import tariffs. At the conclusion of the Uruguay Round of GATT at the end of 1994, all the import tariffs changed for overall manufacturing and processed products, including dairy products. Thailand became the 59th member of WTO in 1994. As part of the tariff reduction phase in 2004, duties will still be in the 30-40 per cent range for processed food products, including all the dairy products. For example, the highest level of import tariffs for SMP was expected to reduce to above quota from 237.4 per cent in 1995 to 216 per cent target in 2004. Domestic content requirements imposed on importers of dairy products were to be eliminated by the end of 1999. SMP importers had to buy 20 times the weight of imported powder in local raw milk equivalent. In prepared milk, the local content requirement is 2 to 1.

Exports of Australia's dairy products are worldwide, to Asia-Pacific, Middle East, Africa, Former Soviet Union countries, and the Americas. Australia's exports of dairy products have grown by 62.13 per cent over the period 1990-2000. Australia's milk dry, including SMP has the main proportion of exports, followed by cheese and butter respectively. Milk condensed and evaporated and whey products are at low level of total exports to the world dairy market. Australia's dairy product exports to South

East Asia and other Asian countries were in high proportion of the total Australian dairy exports. Japan, the Philippines, Malaysia, Singapore, Taiwan and Thailand are the principal importers of Australia's dairy products and their imports are more than 50 per cent of Australia's total exports. However, Australia is still behind the EU and New Zealand (the biggest dairy exporter). There are also five main dairy products of Australia's exports to Thailand: WMP, SMP, cheese, butter and whey products. The aggregate exports of Australia's dairy products rose steadily in the Thai market during 1990-2001.

Under Australia-Thailand free trade agreement (FTA), which started to operate in January 2005, Thailand's import tariffs for Australia's dairy products will decline to zero to 32 per cent, and be phased out by 2010 or 2020. The quotas on Australia's exports of milk powders and milk and cream to the Thai market will be increased by the year 2025.

The estimated trade specialisation index (TSI), export propensity (EPI), import penetration (MP), export/import ratio (EIR), Balassa's index of revealed comparative advantage (RCA) and Vollrath's indexes of revealed competitive advantage (RXA, RTA and RC) identify that among the dairy product exporting countries, Australia has revealed comparative advantage and revealed competitive advantage of all of the dairy products (milk evaporated, milk dry (whey preserved and concentrated butter and cheese and curd). On the other hand, Thailand has revealed comparative advantage and revealed competitive advantage only in milk condensed and evaporated. Thailand has revealed comparative disadvantage and revealed competitive disadvantage in the other dairy product categories. New Zealand, and the selected EU countries have comparative and competitive advantages in most of the dairy products.

These results suggest that Australian dairy exporting companies and policy makers could focus on increasing the volumes of all of the dairy products exported to Thailand, except milk condensed and evaporated.

The results from the unrestricted error correction modelling (UECM) estimation of econometric models of Thailand's demand for Australia's exports of milk dry, butter, and cheese and curd, are summarised as follows. In the short run, the quantity of

Australia's milk dry exports demanded in Thailand declines when Australia's export price relative to that of competing countries increases, while it is not responsive to Thailand's real national income. In the long run, the quantity of Australia's milk dry exports demanded in Thailand declines when Australia's export price relative to that of competing countries' price increases. The less than infinite long run price elasticity of export demand  –2.76 may indicate that Australia has some market power in Thailand in relation to the exports of its milk dry products, an aspect worthy of further examination in future studies.  In the long run, the quantity of Australia's milk dry exports demanded in Thailand does not change significantly in response to changes in Thailand's real national income.

In the short run, the quantity of Australia's butter exports demanded in Thailand falls when Australia's export price relative to that of competing countries increases, but it is not responsive to Thailand's real national income. The quantity of Australia's butter exports demanded in Thailand declines when the Thai baht depreciates against the Australian dollar (or, when AU$ appreciates against the bath). In the long run, the quantity of Australia's butter exports demanded in Thailand decreases when Australia's export price relative to that of competing countries' price increases. The estimated long run relative price elasticity of demand is –1.13. The less than infinite price elasticity may indicate that Australia has some market power in Thailand in relation to the exports of its butter. This aspect that can also be investigated further in future studies. In the long run, the quantity of Australia's butter exports demanded in Thailand does not change significantly in response to changes in Thailand's real national income. The quantity of Australia's butter exports demanded in Thailand declines when the Thai baht depreciates against the Australian dollar (or, when AU$ appreciates against the baht). The estimated long run exchange rate elasticity of demand is –6.34.

In the short run, the quantity of Australia's cheese and curd exports demanded in Thailand is not responsive either to the relative price of exports or to Thailand's real national income. In the long run the quantity of Australia's cheese and curd exports demanded in Thailand changes significantly in response to changes in Thailand's real national income. The estimated long run income elasticity of demand is 1.84.

The results also indicate that in high tariff years in Thailand as well as in the Asian financial crisis years, Thailand's demand for Australia's exports of any of the dairy products considered is not significantly different from that in other years.

The key findings from interviews with export managers of four Australian companies that export dairy products to Thailand with regard to their experiences and problems encountered in the Thai market are summarised next. Thailand is a significant importer of Australia's dairy products, particularly for SMP, WMP, Whey powder, butter and cheese. Thailand's stable economic and political environment is one of the reasons that they are attracted to the Thai market. The volumes of Australia's dairy product exports are around 50,000 to 70,000 tonnes as per Thai import quotas each year. The principal factors that make Australia's products successful in the Thai market are competitive price and clean, green and natural products. These include good quality that is higher than the products of Australia's competitors such as New Zealand and the EU. These factors are the principle strengths of Australia to compete with its competitors in both the world market and the Thai market. However, Australia has some weaknesses in relation to dairy products in the Thai market. Limited Australian product varieties and distribution channels are major factors that contribute to Australia falling behind New Zealand and the EU in the Thai market. The Australian dairy Corporation (ADC) is not involved in promoting Australian dairy products in the Thai market at present, but has done so in the past. The ADC and the Australian government have helped Australian dairy exporters at the initial stages of exporting to Thailand by providing the necessary information about the Thai market.

Thailand has still comprehensive tariff and import quota protection and support to local dairying industry. This is one of the barriers encountered by Australia's exports to Thailand.  For instance, the Thai government uses import quotas and high tariffs for general dairy products such as SMP, WMP, and butter. Australia and Thailand signed a free trade agreement (FTA) in 2004. Under the FTA, it is expected that the Thai government will increase quotas and decrease tariffs for Australia's exports of dairy products to Thailand. All the respondents are hopeful of expanding opportunities for their dairy exports in the Thai market.

These findings imply that Australian dairy export companies could expand the dairy product varieties they export and offer for sale in the Thai market. They could also take advantage of the established sales distribution network in addition to exploring the possibilities for setting up their own distribution channels. They could be looking into the possibilities of setting up of joint ventures with local dairy processing companies in Thailand so that their dairy exports could be expanded. The Australian dairy export companies as well as the ADC have to actively promote in various ways the Australian dairy product exports in the Thai market in order to take advantage of the window of opportunities open to them within the trade liberalisation framework of the Australia-Thailand free trade agreement (FTA).

## 8.4 Limitations of The Study

A limitation of this study arises from the relatively short period for which time series data were available. Export and import data for dairy products of Thailand and Australia's were available from 1998 to 2000 only. For the comparative advantage in Chapter 5, data used were for the period 1990-2001. In the econometric analysis in Chapter 6, time series data used were only for the period 1975-2000.

The main data sources were the Department of Customs of Thailand, the UN and FAO Yearbooks of Trade statistics and the ABS. When certain data series are not directly available, either proxies were used or calculated from the given data. A small number of data points were derived form extrapolation/interpolation in case of missing data points.

For example, for the analysis in Chapter 6, in the absence of data for price indexes of dairy products of Australia and its competing countries in the Thai market, export unit value indexes were used as proxies. The export unit value indexes were derived from the volumes and values of exports of each dairy product category (milk dry, milk and cream, butter and cheese and curd), as shown in Appendix 6.

Another limitation arises from the small number (4) of Australian dairy exporting companies finally agreeing to participate in the interviews, the results of which the discussion in Chapter 7 is based. This was due to other companies' reluctance to

participate. The author used electronic mailing two to three times tin order to obtain permission from 30 companies. But responses were received from only 4 companies.

## 8.5 Directions for Further Research

There are some aspects of research that could be taken up in future studies relating to the subject with which this thesis deals, but are beyond the scope of this thesis.

The findings of the econometric analysis in Chapter 6 revealed that Thailand's demand for Australian exports of milk dry and butter are elastic but less than infinitely elastic with respect to Australia 's export price relative to competitors' export price. This may suggest that Australia has some market power in Thailand with respect to milk dry and butter exports. This is in contrast to the assumption that Australia being a "small country" in the Thai market for these dairy products. This aspect could be an interesting subject for further investigation in future studies.

The findings in Chapter 7 suggest that future studies could also examine the opportunities that Australian dairy export companies might have in expanding the dairy product varieties that may be offered for sale in the Thai market, and the possibilities for setting up of new Australian distribution and promotion channels and the possibilities of establishing joint ventures with local dairy processing companies in Thailand.

Another aspect for further research is the estimation of the magnitude of Australia's dairy product exports to Thailand under the Australia-Thailand free trade agreement (FTA) framework and the potential benefits/losses for each nation as a whole as well as gains/losses to different groups (e.g. consumers, producers, taxpayers) in the two nations involved.

# Appendices

**Appendix for Chapter 5**

**Appendix 5.1: Data used in the Analysis of Trade Specialisation Index (TSI), Export Propensity Index (EPI), Import Penetration Index (MPI) and Exports/Imports Ratio (EIR) for Dairy Products**

**Appendix 5.1.1: Australia's Dairy Production (metric tonne)**

| SITC | Dairy Products | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 022.49 | Milk condensed and evaporated | 86,914 | 95,434 | 89,460 | 104,207 | 106,506 | 103,890 | 94,000 | 88,000 | 86,000 | 105,000 | 92,000 | 83,000 |
| 022.42/43 | Milk dry | 191,524 | 206,302 | 217,913 | 258,628 | 314,017 | 325,000 | 339,000 | 372,000 | 370,000 | 428,000 | 451,000 | 465,000 |
| 022.41 | Whey Preserved and Concentrated | 19,897 | 21,322 | 23,065 | 37,100 | 37,100 | 37,100 | 50,000 | 50,000 | 50,000 | 60,000 | 60,000 | 60,000 |
| 023 | Butter | 104,158 | 105,870 | 110,680 | 126,456 | 142,763 | 138,000 | 145,000 | 147,000 | 161,000 | 200,000 | 170,000 | 151,000 |
| 024 | Cheese and curd | 175,333 | 179,432 | 197,445 | 210,917 | 233,625 | 221,000 | 264,000 | 285,000 | 295,000 | 308,000 | 373,000 | 376,000 |

**Source: FAO, 1990-2001, FAO Trade Yearbook and FAO, 1990-2001, FAO Production Yearbook.**

**Appendix 5.1.2: Thailand's Dairy Production (metric tonne)**

| SITC | Dairy Products | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 022.49 | Milk condensed and evaporated | 12,612 | 15,754 | 14,825 | 56,245 | 75,811 | 75,829 | 33,000 | 30,000 | 30,000 | 32,000 | 32,000 | 26,000 |

**Source: FAO, 1990-2001, FAO Trade Yearbook and FAO, 1990-2001, FAO Production Yearbook.**

**Appendix 5.1.3: Australia's Total Exports and Imports of Dairy Products (metric tonne)**

| SITC | Dairy Products | | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 022.49 | Milk condensed and evaporated | Exports | 2,417 | 3,063 | 3,301 | 4,661 | 7,338 | 14,212 | 25,510 | 14,431 | 22,829 | 37,512 | 25,087 | 27,988 |
| | | Imports | 432 | 239 | 395 | 466 | 696 | 1200 | 1449 | 1020 | 1350 | 927 | 1,101 | 924 |
| 022.42/43 | Milk dry | Exports | 160,509 | 179,723 | 179,620 | 199,226 | 260,402 | 290,052 | 323,213 | 340,812 | 356,833 | 396,966 | 423,182 | 370,405 |
| | | Imports | 2,314 | 2,754 | 4,976 | 6,328 | 4,133 | 4,760 | 5,532 | 5,800 | 6,200 | 10,123 | 7,633 | 8,230 |
| 022.41 | Whey Preserved and Concentrated | Exports | 12,187 | 10,634 | 20,264 | 26,100 | 21,018 | 31,479 | 35,071 | 32,393 | 40,011 | 43,372 | 38,930 | 37,896 |
| | | Imports | 1,189 | 972 | 907 | 896 | 1,351 | 2,520 | 2,045 | 2,600 | 2,200 | 2,819 | 2,618 | 2,061 |
| 023 | Butter | Exports | 49,569 | 50,621 | 51,328 | 69,606 | 85,657 | 81,914 | 83,781 | 116,184 | 99,761 | 145,164 | 114,849 | 97,411 |
| | | Imports | 1,045 | 1,066 | 1,945 | 1,827 | 2,025 | 3,000 | 5,475 | 4,100 | 4,400 | 8,323 | 10,688 | 9,993 |
| 024 | Cheese and curd | Exports | 55,920 | 64,008 | 69,304 | 86,100 | 104,717 | 116,300 | 135,157 | 149,974 | 182,039 | 208,230 | 232,735 | 206,303 |
| | | Imports | 20,728 | 22,546 | 25,082 | 25,504 | 27,373 | 27,828 | 33,725 | 30,600 | 28,000 | 36,683 | 38,819 | 46,615 |

**Appendix 5.1.4: Thailand's Total Exports and Imports of Dairy Products (metric tonne)**

| SITC | Dairy Products | | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 022.49 | Milk condensed and evaporated | Exports | 1,648 | 4,785 | 8148 | 11,141 | 14,591 | 20,638 | 19,132 | 21,602 | 25,536 | 23,622 | 30,307 | 94,154 |
| | | Imports | na | 91 | 90 | 108 | 220 | 106 | 175 | 2351 | 1817 | 1287 | 4690 | 2230 |
| 022.42/43 | Milk dry | Exports | 1,991 | 4,007 | 2,386 | 3,096 | 7,034 | 2,346 | 2,633 | 2,976 | 3,288 | 3,017 | 2,552 | 2,791 |
| | | Imports | 64,862 | 69,191 | 86,891 | 77,031 | 102,640 | 121,111 | 117,604 | 140,171 | 103,278 | 105,827 | 101,273 | 95,187 |
| 022.41 | Whey Preserved and Concentrated | Exports | 5,866 | 1,080 | 338 | 535 | 332 | 372 | 446 | 1226 | 466 | 672 | 1,974 | 1,683 |
| | | Imports | 10,746 | 11,715 | 7,420 | 8,530 | 7,819 | 11,813 | 16,741 | 25,589 | 16,222 | 22,832 | 32,434 | 36,971 |
| 023 | Butter | Exports | na | 44 | 1 | 2 | na | 3 | 4 | 7 | 2 | 59 | 64 | 16 |
| | | Imports | 10,058 | 11,903 | 14,097 | 12,378 | 18,541 | 9,135 | 7,644 | 12,750 | 10,535 | 11,043 | 12,619 | 12,221 |
| 024 | Cheese and curd | Exports | 4 | 1 | 1 | 4 | 10 | 444 | 5 | 133 | 39 | 135 | 29 | 20 |
| | | Imports | 941 | 1,185 | 1,365 | 1,135 | 1,470 | 1,607 | 1,515 | 1,756 | 1,314 | 1,382 | 1,666 | 2543 |

**Source: FAO, 1990-2001, FAO Trade Yearbook and FAO, 1990-2001, FAO Production Yearbook.**

**Appendix 5.2: Data used in the Analysis of the Balassa's Revealed Comparative Advantage**

**Appendix 5.2.1: Australia's Total Exports of Dairy Products (U.S. dollar million)**

| SITC | Dairy Products | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 022.49 | Milk condensed and evaporated | 3 | 4 | 3 | 4 | 7 | 13 | 25 | 14 | 18 | 28 | 22 | 25 |
| 022.42/43 | Milk dry | 281 | 306 | 295 | 376 | 420 | 494 | 669 | 647 | 582 | 595 | 722 | 756 |
| 022.41 | Whey Preserved and Concentrated | 5 | 5 | 12 | 14 | 11 | 19 | 25 | 22 | 28 | 32 | 33 | 39 |
| 023 | Butter | 92 | 82 | 86 | 110 | 126 | 118 | 161 | 183 | 171 | 185 | 169 | 148 |
| 024 | Cheese and curd | 148 | 164 | 177 | 224 | 257 | 298 | 367 | 389 | 429 | 463 | 529 | 507 |
| 022,023,024 | Total | 558 | 592 | 615 | 768 | 869 | 1,019 | 1,337 | 1,326 | 1,318 | 1,392 | 1,561 | 1,552 |

**Source: FAO, 1990-2001, FAO Trade Yearbook**.

**Appendix 5.2.2: Thailand's Total Exports of Dairy Products (U.S. dollar million)**

| SITC | Dairy Products | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 022.49 | Milk condensed and evaporated | 1 | 5 | 8 | 12 | 16 | 22 | 28 | 23 | 21 | 20 | 24 | 70 |
| 022.42/43 | Milk dry | 4 | 5 | 4 | 5 | 13 | 6 | 7 | 7 | 7 | 5 | 4 | 4 |
| 022.41 | Whey Preserved and Concentrated | 6 | 1 | 0.3 | 0.5 | 0.3 | 0.4 | 0.5 | 1 | 0.4 | 0.6 | 1 | 1 |
| 023 | Butter | na | 0.07 | 0.005 | 0.003 | na | 0.004 | 0.005 | 0.005 | 0.01 | 0.1 | 0.1 | 0.03 |
| 024 | Cheese and curd | 0.01 | 0.002 | 0.003 | 0.005 | 0.006 | 0.3 | 0.006 | 0.07 | 0.1 | 0.04 | 0.03 | 0.03 |
| 022,023,024 | Total | na | 12.072 | 14.008 | 21.008 | na | 33.304 | 35.011 | 36.075 | 33.11 | 32.50 | 36.13 | 90.06 |

**Source: FAO, 1990-2001, FAO Trade Yearbook**.

**Appendix 5.2.3: New Zealand's Total Exports of Dairy Products (U.S. dollar million)**

| SITC | Dairy Products | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 022.49 | Milk condensed and evaporated | 2 | 2 | 3 | 2 | 3 | 3 | 4 | 5 | 5 | 10 | 6 | 5 |
| 022.42/43 | Milk dry | 575 | 692 | 701 | 794 | 795 | 864 | 960 | 1,167 | 907 | 861 | 1,055 | 1,552 |
| 022.41 | Whey Preserved and Concentrated | na | na | 3 | 3 | 4 | 4 | 5 | 5 | 4 | 5 | 4 | 8 |
| 023 | Butter | 417 | 429 | 364 | 448 | 469 | 459 | 575 | 638 | 549 | 424 | 515 | 437 |
| 024 | Cheese and curd | 200 | 222 | 115 | 252 | 297 | 383 | 412 | 583 | 479 | 511 | 500 | 606 |
| 022,023,024 | Total | 1,202 | 997 | 831 | 1,134 | 1,252 | 1,445 | 1,796 | 2,445 | 1,987 | 1,856 | 2,127 | 2,660 |

**Source: FAO, 1990-2001, FAO Trade Yearbook**.

**Appendix 5.2.4: USA's Total Exports of Dairy Products (U.S. dollar million)**

| SITC | Dairy Products | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 022.49 | Milk condensed and evaporated | 3 | 6 | 13 | 10 | 15 | 22 | 22 | 6 | 7 | 4 | 5 | 10 |
| 022.42/43 | Milk dry | 24 | 76 | 164 | 203 | 133 | 219 | 57 | 186 | 193 | 189 | 201 | 249 |
| 022.41 | Whey Preserved and Concentrated | 35 | 60 | 63 | 63 | 72 | 95 | 121 | 119 | 117 | 119 | 160 | 137 |
| 023 | Butter | 111 | 45 | 158 | 170 | 108 | 63 | 42 | 27 | 14 | 5 | 9 | 5 |
| 024 | Cheese and curd | 44 | 44 | 60 | 67 | 82 | 101 | 120 | 137 | 130 | 148 | 148 | 169 |
| 022,023,024 | Total | 250 | 276 | 517 | 581 | 483 | 542 | 410 | 537 | 512 | 502 | 571 | 622 |

**Source: FAO, 1990-2001, FAO Trade Yearbook.**

**Appendix 5.2.5: Denmark's Total Exports of Dairy Products (U.S. dollar million)**

| SITC | Dairy Products | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 022.49 | Milk condensed and evaporated | 0.2 | 0.5 | 0.6 | 0.2 | 0.1 | 0.05 | 0.1 | 0.1 | 0.1 | 0.05 | 0.04 | 3 |
| 022.42/43 | Milk dry | 288 | 250 | 274 | 250 | 306 | 306 | 298 | 296 | 297 | 237 | 206 | 186 |
| 022.41 | Whey Preserved and Concentrated | 22 | 15 | 20 | 13 | 15 | 23 | 22 | 25 | 24 | 21 | 20 | 20 |
| 023 | Butter | 187 | 185 | 191 | 139 | 170 | 178 | 198 | 137 | 152 | 140 | 125 | 123 |
| 024 | Cheese and curd | 693 | 703 | 746 | 730 | 834 | 952 | 996 | 971 | 985 | 978 | 904 | 862 |
| 022,023,024 | Total | 1,234 | 1,215 | 1,281 | 1,178 | 1,378 | 1,512 | 1,565 | 1,488 | 1,485 | 1,444 | 1,348 | 1,276 |

**Source: FAO, 1990-2001, FAO Trade Yearbook.**


**Appendix 5.2.6: France's Total Exports of Dairy Products (U.S. dollar million)**

| SITC | Dairy Products | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 022.49 | Milk condensed and evaporated | 59 | 54 | 81 | 68 | 59 | 72 | 59 | 61 | 52 | 51 | 58 | 45 |
| 022.42/43 | Milk dry | 837 | 694 | 746 | 666 | 808 | 973 | 784 | 831 | 699 | 639 | 625 | 542 |
| 022.41 | Whey Preserved and Concentrated | 114 | 154 | 202 | 150 | 157 | 211 | 211 | 177 | 211 | 201 | 206 | 226 |
| 023 | Butter | 330 | 327 | 260 | 268 | 267 | 329 | 264 | 227 | 204 | 190 | 176 | 177 |
| 024 | Cheese and curd | 1,605 | 1,645 | 1,863 | 1,840 | 1,976 | 2,240 | 2,291 | 2,000 | 2,012 | 1,957 | 1,864 | 1,769 |
| 022,023,024 | Total | 3,401 | 3,333 | 3,715 | 3,535 | 3,927 | 4,579 | 4,327 | 3,987 | 3,904 | 3,766 | 3,606 | 3,479 |

**Source: FAO, 1990-2001, FAO Trade Yearbook.**

**Appendix 5.2.7: Germany's Total Exports of Dairy Products (U.S. dollar million)**

| SITC | Dairy Products | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 022.49 | Milk condensed and evaporated | 243 | 240 | 336 | 273 | 291 | 348 | 354 | 362 | 347 | 327 | 322 | 338 |
| 022.42/43 | Milk dry | 743 | 1,054 | 1,361 | 1,161 | 914 | 1,089 | 1,067 | 803 | 744 | 689 | 687 | 657 |
| 022.41 | Whey Preserved and Concentrated | 31 | 50 | 74 | 78 | 79 | 88 | 94 | 83 | 101 | 83 | 113 | 133 |
| 023 | Butter | 225 | 450 | 226 | 213 | 158 | 232 | 180 | 151 | 138 | 139 | 135 | 128 |
| 024 | Cheese and curd | 1,246 | 1,164 | 1,402 | 1,315 | 1,415 | 1,482 | 1,737 | 1,672 | 1,626 | 1,378 | 1,436 | 1,596 |
| 022,023,024 | Total | 3,363 | 4,032 | 4,626 | 4,117 | 4,040 | 4,542 | 4,846 | 4,532 | 4,498 | 3,805 | 3,975 | 4,056 |

**Source: FAO, 1990-2001, FAO Trade Yearbook.**

**Appendix 5.2.8: Ireland's Total Exports of Dairy Products (U.S. dollar million)**

| SITC | Dairy Products | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 022.49 | Milk condensed and evaporated | 4 | 1 | 3 | 2 | 3 | 4 | 0.7 | 0.8 | 0.5 | 0.1 | 0.1 | 0.08 |
| 022.42/43 | Milk dry | 237 | 208 | 655 | 372 | 298 | 513 | 248 | 315 | 204 | 263 | 325 | 185 |
| 022.41 | Whey Preserved and Concentrated | 30 | 30 | 49 | 29 | 22 | 48 | 43 | 45 | 45 | 41 | 42 | 50 |
| 023 | Butter | 252 | 461 | 556 | 458 | 395 | 583 | 438 | 479 | 481 | 385 | 323 | 294 |
| 024 | Cheese and curd | 287 | 256 | 390 | 226 | 337 | 314 | 385 | 314 | 309 | 290 | 268 | 345 |
| 022,023,024 | Total | 842 | 992 | 1,699 | 1,153 | 1,144 | 1,576 | 1,206 | 1,247 | 1,125 | 1,059 | 1,038 | 945 |

**Source: FAO, 1990-2001, FAO Trade Yearbook**.

**Appendix 5.2.9: Netherlands's Total Exports of Dairy Products (U.S. dollar million)**

| SITC | Dairy Products | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|------|----------------|------|------|------|------|------|------|------|------|------|------|------|------|
| 022.49 | Milk condensed and evaporated | 472 | 412 | 440 | 404 | 371 | 378 | 377 | 269 | 270 | 276 | 236 | 273 |
| 022.42/43 | Milk dry | 915 | 620 | 751 | 738 | 614 | 924 | 675 | 596 | 575 | 583 | 575 | 563 |
| 022.41 | Whey Preserved and Concentrated | 80 | 87 | 93 | 82 | 84 | 108 | 102 | 93 | 110 | 95 | 100 | 98 |
| 023 | Butter | 589 | 634 | 712 | 688 | 550 | 621 | 566 | 490 | 499 | 471 | 283 | 390 |
| 024 | Cheese and curd | 1,800 | 1,938 | 2,186 | 1,894 | 2,052 | 2,098 | 2,272 | 1,707 | 1,757 | 1,685 | 1,418 | 1,457 |
| 022,023,024 | Total | 3,973 | 3,815 | 4,320 | 3,965 | 3,916 | 4,398 | 4,300 | 3,394 | 3,453 | 3,405 | 2,863 | 2,981 |

**Source: FAO, 1990-2001, FAO Trade Yearbook.**


**Appendix 5.2.10: UK's Total Exports of Dairy Products (U.S. dollar million)**

| SITC | Dairy Products | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|------|----------------|------|------|------|------|------|------|------|------|------|------|------|------|
| 022.49 | Milk condensed and evaporated | 47 | 50 | 55 | 44 | 45 | 62 | 60 | 67 | 67 | 51 | 31 | 23 |
| 022.42/43 | Milk dry | 351 | 284 | 331 | 267 | 292 | 343 | 249 | 345 | 318 | 265 | 283 | 213 |
| 022.41 | Whey Preserved and Concentrated | 15 | 12 | 18 | 9 | 9 | 15 | 17 | 19 | 16 | 15 | 20 | 29 |
| 023 | Butter | 139 | 121 | 173 | 181 | 184 | 209 | 196 | 227 | 202 | 170 | 126 | 115 |
| 024 | Cheese and curd | 151 | 166 | 179 | 183 | 199 | 199 | 233 | 190 | 206 | 221 | 192 | 211 |
| 022,023,024 | Total | 769 | 748 | 890 | 875 | 963 | 1,069 | 986 | 1,056 | 1,083 | 981 | 861 | 779 |

**Source: FAO, 1990-2001, FAO Trade Yearbook.**

**Appendix 5.2.11: Total Exports of All Commodities by Country (U.S. dollar million)**

| Country | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Australia | 39,760 | 41,855 | 42,839 | 42,715 | 47,525 | 53,097 | 60,300 | 62,901 | 55,893 | 56,080 | 63,878 | 63,389 |
| Thailand | 23,084 | 28,428 | 32,473 | 37,173 | 45,236 | 56,191 | 55,526 | 57,402 | 54,458 | 58,440 | 69,057 | 65,114 |
| New Zealand | 9,394 | 9,649 | 9,839 | 10,537 | 12,185 | 13,645 | 14,362 | 14,052 | 12,069 | 12,454 | 13,272 | 13,724 |
| USA | 393,592 | 421,730 | 448,163 | 464,773 | 512,627 | 584,743 | 625,073 | 688,697 | 682,138 | 702,098 | 781,125 | 730,803 |
| Denmark | 35,135 | 38,011 | 39,646 | 36,707 | 41,422 | 49,763 | 50,101 | 48,042 | 47,481 | 48,698 | 49,480 | 50,409 |
| France | 210,169 | 213,441 | 231,913 | 206,259 | 236,072 | 287,334 | 288,658 | 288,867 | 305,664 | 302,472 | 299,650 | 295,671 |
| Germany | 422,041 | 402,845 | 430,272 | 385,296 | 429,075 | 508,398 | 524,228 | 511,716 | 543,431 | 542,884 | 550,260 | 571,460 |
| Ireland | 23,747 | 24,223 | 28,336 | 28,356 | 34,155 | 44,638 | 48,621 | 53,059 | 81,576 | 71,221 | 77,097 | 83,015 |
| Netherlands | 131,783 | 133,684 | 139,967 | 131,156 | 155,554 | 196,276 | 197,420 | 194,011 | 201,382 | 200,267 | 208,899 | 216,117 |
| UK | 185,326 | 185,306 | 190,542 | 181,559 | 204,009 | 242,036 | 262,130 | 281,079 | 271,851 | 268,203 | 281,525 | 267,357 |

**Source: the United Nations, 1990-2001, International Trade Statistics Yearbook.**

**Appendix 5.2.12: Total Dairy Product Exports of the World (U.S. dollar million)**

| SITC | Dairy Products | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 022.49 | Milk condensed and evaporated | 1,040 | 1,017 | 1,185 | 1,052 | 1,024 | 1,195 | 1,237 | 1,219 | 1,163 | 1,068 | 1,014 | 1,164 |
| 022.42/43 | Milk dry | 5,256 | 5,114 | 6,446 | 6,030 | 6,091 | 7,804 | 6,835 | 6,795 | 6,008 | 5,860 | 6,565 | 7,010 |
| 022.41 | Whey Preserved and Concentrated | 364 | 445 | 581 | 480 | 499 | 678 | 725 | 687 | 754 | 705 | 819 | 879 |
| 023 | Butter | 3,149 | 3,387 | 3,501 | 3,341 | 3,228 | 3,994 | 3,710 | 3,600 | 3,483 | 32,913 | 2,666 | 2,769 |
| 024 | Cheese and curd | 8,027 | 8,207 | 9,284 | 8,768 | 9,767 | 10,616 | 11,546 | 10,613 | 10,737 | 10,341 | 10,008 | 10,604 |
| 022,023,024 | Total | 19,968 | 20,671 | 23,931 | 22,555 | 23,955 | 28,183 | 28,363 | 27,166 | 26,767 | 25,266 | 25,355 | 26,807 |

**Source: FAO, 1990-2001, FAO Trade Yearbook.**

**Appendix 5.2.13: World's Total Exports of All Commodities (U.S. dollar million)**

| 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 3,437,400 | 3,421,117 | 3,854,821 | 3,634,614 | 4,169,166 | 4,969,399 | 5,173,162 | 5,337,073 | 5,238,965 | 5,421,505 | 6,048,039 | 5,814,640 |

**Source: the United Nations, 1990-2001, International Trade Statistics Yearbook.**

**Appendix 5.3: Data used in the Analysis of the Vollrath's Revealed Competitive Advantage**

**Appendix 5.3.1: Australia's Total Exports and Imports of Dairy Products (U.S. dollar million)**

| SITC | Dairy Products | | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 022.49 | Milk condensed and evaporated | Exports | 3 | 4 | 3 | 4 | 7 | 13 | 25 | 14 | 18 | 28 | 22 | 25 |
| | | Imports | 1 | 1 | 1 | 1 | 2 | 3 | 4 | 3 | 4 | 2 | 2 | 2 |
| 022.42/43 | Milk dry | Exports | 281 | 306 | 295 | 376 | 420 | 494 | 669 | 647 | 582 | 595 | 722 | 756 |
| | | Imports | 4 | 5 | 8 | 11 | 7 | 9 | 11 | 12 | 12 | 15 | 11 | 14 |
| 022.41 | Whey Preserved and Concentrated | Exports | 5 | 5 | 12 | 14 | 11 | 19 | 25 | 22 | 28 | 32 | 33 | 39 |
| | | Imports | 2 | 1 | 1 | 2 | 2 | 4 | 4 | 5 | 4 | 5 | 5 | 5 |
| 023 | Butter | Exports | 92 | 82 | 86 | 110 | 126 | 118 | 161 | 183 | 171 | 185 | 169 | 148 |
| | | Imports | 2 | 2 | 3 | 2 | 3 | 5 | 10 | 10 | 11 | 14 | 16 | 14 |
| 024 | Cheese and curd | Exports | 148 | 164 | 177 | 224 | 257 | 298 | 367 | 389 | 429 | 463 | 529 | 507 |
| | | Imports | 67 | 77 | 78 | 77 | 79 | 87 | 108 | 98 | 91 | 113 | 105 | 116 |
| 022,023,024 | Total | Exports | 558 | 592 | 615 | 768 | 869 | 1,019 | 1,337 | 1,326 | 1,318 | 1,392 | 1,561 | 1,552 |
| | | Imports | 80 | 90 | 97 | 102 | 105 | 116 | 146 | 134 | 132 | 165 | 153 | 164 |

**Source: FAO, 1990-2001, FAO Trade Yearbook.**

**Appendix 5.3.2: Thailand's Total Exports and Imports of Dairy Products (U.S. dollar million)**

| SITC | Dairy Products | | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 022.49 | Milk condensed and evaporated | Exports | 1 | 5 | 8 | 12 | 16 | 22 | 28 | 23 | 21 | 20 | 24 | 70 |
| | | Imports | 0.1 | 0.1 | 0.1 | 0.1 | 0.7 | 0.2 | 0.4 | 4 | 2 | 2 | 4 | 2 |
| 022.42/43 | Milk dry | Exports | 4 | 5 | 4 | 5 | 13 | 6 | 7 | 7 | 7 | 5 | 4 | 4 |
| | | Imports | 130 | 123 | 178 | 165 | 193 | 266 | 295 | 314 | 230 | 199 | 189 | 211 |
| 022.41 | Whey Preserved and Concentrated | Exports | 6 | 1 | 0.3 | 0.5 | 0.3 | 0.4 | 0.5 | 1 | 0.4 | 0.6 | 1 | 1 |
| | | Imports | 5 | 6 | 5 | 5 | 4 | 7 | 11 | 16 | 11 | 14 | 18 | 24 |
| 023 | Butter | Exports | na | 0.07 | 0.005 | 0.003 | na | 0.004 | 0.005 | 0.005 | 0.01 | 0.1 | 0.1 | 0.03 |
| | | Imports | 21 | 22 | 27 | 22 | 31 | 18 | 18 | 25 | 22 | 22 | 20 | 20 |
| 024 | Cheese and curd | Exports | 0.01 | 0.002 | 0.003 | 0.005 | 0.006 | 0.3 | 0.006 | 0.07 | 0.1 | 0.04 | 0.03 | 0.03 |
| | | Imports | 3 | 4 | 4 | 4 | 5 | 6 | 6 | 6 | 4 | 4 | 4 | 7 |
| 022,023,024 | Total | Exports | na | 12.072 | 14.008 | 21.008 | na | 33.304 | 35.011 | 36.075 | 33.11 | 32.50 | 36.13 | 90.06 |
| | | Imports | 163 | 158 | 219 | 204 | 246 | 330 | 369 | 380 | 280 | 248 | 249 | 290 |

**Source: FAO, 1990-2001, FAO Trade Yearbook.**

**Appendix 5.3.3: New Zealand's Total Exports and Imports of Dairy Products (U.S. dollar million)**

| SITC | Dairy Products | | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 022.49 | Milk condensed and evaporated | Exports | 2 | 2 | 3 | 2 | 3 | 3 | 4 | 5 | 5 | 10 | 6 | 5 |
| | | Imports | 1 | 1 | 0.8 | 0.6 | 0.7 | 0.2 | 0.4 | 1 | 1 | 3 | 4 | 3 |
| 022.42/43 | Milk dry | Exports | 575 | 692 | 701 | 794 | 795 | 864 | 960 | 1,167 | 907 | 861 | 1,055 | 1,552 |
| | | Imports | 0.1 | 3 | 3 | 0.3 | 0.9 | 0.7 | 1 | 2 | 2 | 3 | 3 | 3 |
| 022.41 | Whey Preserved and Concentrated | Exports | na | na | 3 | 3 | 4 | 4 | 5 | 5 | 4 | 5 | 4 | 8 |
| | | Imports | 5 | 6 | 5 | 5 | 4 | 7 | 11 | 16 | 11 | 14 | 18 | 24 |
| 023 | Butter | Exports | 417 | 429 | 364 | 448 | 469 | 459 | 575 | 638 | 549 | 424 | 515 | 437 |
| | | Imports | 0.2 | 0.03 | 0.009 | 0.01 | 0.09 | 0.1 | 0.3 | 1 | 1 | 1 | 1 | 0.5 |
| 024 | Cheese and curd | Exports | 200 | 222 | 115 | 252 | 297 | 383 | 412 | 583 | 479 | 511 | 500 | 606 |
| | | Imports | 3 | 3 | 3 | 3 | 4 | 7 | 10 | 8 | 9 | 7 | 6 | 5 |
| 022,023,024 | Total | Exports | 1,202 | 997 | 831 | 1,134 | 1,252 | 1,445 | 1,796 | 2,445 | 1,987 | 1,856 | 2,127 | 2,660 |
| | | Imports | 5.2 | 8.03 | 7.009 | 6.01 | 7.09 | 12.1 | 20.3 | 16 | 15 | 15 | 17 | 16.5 |

**Source: FAO, 1990-2001, FAO Trade Yearbook.**

**Appendix 5.3.4: Denmark's Total Exports and Imports of Dairy Products (U.S. dollar million)**

| SITC | Dairy Products | | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 022.49 | Milk condensed and evaporated | Exports | 0.2 | 0.5 | 0.6 | 0.2 | 0.1 | 0.05 | 0.1 | 0.1 | 0.1 | 0.05 | 0.04 | 3 |
| | | Imports | 1 | 2 | 2 | 2 | 2 | 0.9 | 1 | 1 | 0.9 | 1 | 1 | 2 |
| 022.42/43 | Milk dry | Exports | 288 | 250 | 274 | 250 | 306 | 306 | 298 | 296 | 297 | 237 | 206 | 186 |
| | | Imports | 16 | 16 | 20 | 10 | 12 | 18 | 15 | 18 | 11 | 14 | 9 | 9 |
| 022.41 | Whey Preserved and Concentrated | Exports | 22 | 15 | 20 | 13 | 15 | 23 | 22 | 25 | 24 | 21 | 20 | 20 |
| | | Imports | 7 | 8 | 9 | 6 | 6 | 7 | 8 | 9 | 7 | 6 | 8 | 12 |
| 023 | Butter | Exports | 187 | 185 | 191 | 139 | 170 | 178 | 198 | 137 | 152 | 140 | 125 | 123 |
| | | Imports | 29 | 44 | 31 | 46 | 38 | 79 | 71 | 71 | 58 | 47 | 54 | 42 |
| 024 | Cheese and curd | Exports | 693 | 703 | 746 | 730 | 834 | 952 | 996 | 971 | 985 | 978 | 904 | 862 |
| | | Imports | 52 | 58 | 62 | 70 | 77 | 78 | 102 | 97 | 93 | 106 | 111 | 123 |
| 022,023,024 | Total | Exports | 1,234 | 1,215 | 1,281 | 1,178 | 1,378 | 1,512 | 1,565 | 1,488 | 1,485 | 1,444 | 1,348 | 1,276 |
| | | Imports | 110 | 135 | 135 | 142 | 143 | 195 | 211 | 214 | 189 | 192 | 206 | 219 |

**Source: FAO, 1990-2001, FAO Trade Yearbook.**

**Appendix 5.3.5: Netherlands's Total Exports and Imports of Dairy Products (U.S. dollar million)**

| SITC | Dairy Products | | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 022.49 | Milk condensed and evaporated | Exports | 472 | 412 | 440 | 404 | 371 | 378 | 377 | 269 | 270 | 276 | 236 | 273 |
| | | Imports | 168 | 152 | 221 | 122 | 157 | 177 | 167 | 143 | 167 | 186 | 162 | 131 |
| 022.42/43 | Milk dry | Exports | 915 | 620 | 751 | 738 | 614 | 924 | 675 | 596 | 575 | 583 | 575 | 563 |
| | | Imports | 778 | 658 | 932 | 731 | 777 | 1,284 | 813 | 702 | 527 | 712 | 612 | 463 |
| 022.41 | Whey Preserved and Concentrated | Exports | 80 | 87 | 93 | 82 | 84 | 108 | 102 | 93 | 110 | 95 | 100 | 98 |
| | | Imports | 104 | 120 | 175 | 112 | 126 | 158 | 159 | 113 | 156 | 147 | 116 | 145 |
| 023 | Butter | Exports | 589 | 634 | 712 | 688 | 550 | 621 | 566 | 490 | 499 | 471 | 283 | 390 |
| | | Imports | 347 | 389 | 381 | 433 | 252 | 333 | 248 | 281 | 230 | 300 | 187 | 200 |
| 024 | Cheese and curd | Exports | 1,800 | 1,938 | 2,186 | 1,894 | 2,052 | 2,098 | 2,272 | 1,707 | 1,757 | 1,685 | 1,418 | 1,457 |
| | | Imports | 279 | 324 | 377 | 366 | 371 | 386 | 367 | 281 | 230 | 300 | 268 | 354 |
| 022,023,024 | Total | Exports | 3,973 | 3,815 | 4,320 | 3,965 | 3,916 | 4,398 | 4,300 | 3,394 | 3,453 | 3,405 | 2,863 | 2,981 |
| | | Imports | 2002 | 2013 | 2463 | 2021 | 2041 | 2766 | 2204 | 1859 | 1627 | 1990 | 1560 | 1508 |

**Source: FAO, 1990-2001, FAO Trade Yearbook**.

**Appendix 5.3.6: Total Exports and Imports of All Commodities by Country (U.S. dollar million)**

| Country | | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Australia | Exports | 39,760 | 41,855 | 42,839 | 42,715 | 47,525 | 53,097 | 60,300 | 62,901 | 55,893 | 56,080 | 63,878 | 63,389 |
| | Imports | 42,024 | 41,651 | 43,808 | 45,478 | 53,425 | 60,317 | 65,429 | 65,910 | 64,630 | 69,158 | 71,537 | 63,890 |
| Thailand | Exports | 23,084 | 28,428 | 32,473 | 37,173 | 45,236 | 56,191 | 55,526 | 57,402 | 54,458 | 58,440 | 69,057 | 65,114 |
| | Imports | 33,031 | 37,579 | 40,680 | 46,076 | 54,438 | 73,426 | 72,168 | 62.880 | 42,971 | 50,343 | 61,924 | 62,058 |
| New Zealand | Exports | 9,394 | 9,649 | 9,839 | 10,537 | 12,185 | 13,645 | 14,362 | 14,052 | 12,069 | 12,454 | 13,272 | 13,724 |
| | Imports | 9,501 | 8,408 | 9,218 | 9,636 | 11,913 | 13,959 | 14,725 | 14,520 | 12,496 | 14,299 | 13,906 | 13,347 |
| Denmark | Exports | 35,135 | 38,011 | 39,646 | 36,707 | 41,422 | 49,763 | 50,101 | 48,042 | 47,481 | 48,698 | 49,480 | 50,409 |
| | Imports | 32,230 | 32,411 | 35,185 | 30,546 | 34,882 | 45,090 | 44,435 | 44,208 | 45,427 | 44,067 | 43,713 | 43,430 |
| Netherlands | Exports | 131,783 | 133,684 | 139,967 | 131,156 | 155,554 | 196,276 | 197,420 | 194,011 | 201,382 | 200,267 | 208,899 | 216,117 |
| | Imports | 126,485 | 127,251 | 134,670 | 124,742 | 141,317 | 176,873 | 180,641 | 177,376 | 187,754 | 190,285 | 197,535 | 194,925 |

**Source: the United Nations, 1990-2001, International Trade Statistics Yearbook.**

**Appendix 5.3.7: Total Dairy Product Exports and Imports of the World (U.S. dollar million)**

| SITC | Dairy Products | | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 022.49 | Milk condensed and evaporated | Exports | 1,040 | 1,017 | 1,185 | 1,052 | 1,024 | 1,195 | 1,237 | 1,219 | 1,163 | 1,068 | 1,014 | 1,164 |
| | | Imports | 1,167 | 1,087 | 1,356 | 1,113 | 1,135 | 1,330 | 1,235 | 1,119 | 1,216 | 1,148 | 1,103 | 1,180 |
| 022.42/43 | Milk dry | Exports | 5,256 | 5,114 | 6,446 | 6,030 | 6,091 | 7,804 | 6,835 | 6,795 | 6,008 | 5,860 | 6,565 | 7,010 |
| | | Imports | 5,730 | 5,426 | 6,424 | 6,113 | 6,174 | 8,412 | 7,529 | 6,712 | 6,124 | 6,145 | 6,401 | 6,396 |
| 022.41 | Whey Preserved and Concentrated | Exports | 364 | 445 | 581 | 480 | 499 | 678 | 725 | 687 | 754 | 705 | 819 | 875 |
| | | Imports | 369 | 436 | 554 | 418 | 489 | 659 | 665 | 618 | 721 | 717 | 721 | 860 |
| 023 | Butter | Exports | 3,149 | 3,387 | 3,501 | 3,341 | 3,228 | 3,994 | 3,710 | 3,600 | 3,483 | 2,913 | 2,666 | 2,769 |
| | | Imports | 3,305 | 3,332 | 3,654 | 3,514 | 3,086 | 4,027 | 3,469 | 3,503 | 3,396 | 3,113 | 2,747 | 2,784 |
| 024 | Cheese and curd | Exports | 8,027 | 8,207 | 9,284 | 8,768 | 9,767 | 10,616 | 11,546 | 10,613 | 10,737 | 10,341 | 10,008 | 10,604 |
| | | Imports | 8,269 | 8,345 | 9,319 | 8,452 | 9,426 | 10,226 | 10,754 | 9,913 | 10,147 | 9,930 | 9,502 | 10,151 |
| 022,023,024 | Total | Exports | 19,968 | 20,671 | 23,931 | 22,555 | 23,955 | 28,183 | 28,363 | 27,166 | 26,767 | 25,266 | 25,355 | 26,807 |
| | | Imports | 20,976 | 21,171 | 24,403 | 22,635 | 23,950 | 28,899 | 28,082 | 26,476 | 26,324 | 25,849 | 24,948 | 25,880 |

**Source: FAO, 1990-2001, FAO Trade Yearbook.**

**Appendix 5.3.8: World's Total Exports of All Commodities (U.S. dollar million) (**

| | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Exports | 3,437,400 | 3,421,117 | 3,854,821 | 3,634,614 | 4,169,166 | 4,969,399 | 5,173,162 | 5,337,073 | 5,238,965 | 5,421,505 | 6,048,039 | 5,814,640 |
| Imports | 3,566,693 | 3,545,855 | 3,804,855 | 3,722,472 | 4,263,063 | 5,067,958 | 5,315,423 | 5,471,336 | 5,295,049 | 5,511,403 | 6,203,546 | 5,981,409 |

**Source: the United Nations, 1990-2001, International Trade Statistics Yearbook.**

**Appendix for Chapter 6**

**Appendix 6.1: Thailand's Real GDP and Exchange Rate calculated using data from dxEcondata**

| Year | Thailand's Real GDP (billion bath) | Exchange Rate (Thai bath/Australian dollar) |
|---|---|---|
| 1975 | 885.83 | 26.68 |
| 1976 | 968.44 | 24.93 |
| 1977 | 1,068.78 | 22.62 |
| 1978 | 1,173.30 | 23.27 |
| 1979 | 1,236.31 | 22.82 |
| 1980 | 1,300.28 | 23.31 |
| 1981 | 1,377.08 | 25.07 |
| 1982 | 1,450.78 | 23.33 |
| 1983 | 1,531.81 | 20.72 |
| 1984 | 1,619.20 | 20.74 |
| 1985 | 1,695.20 | 18.97 |
| 1986 | 1,789.02 | 17.58 |
| 1987 | 1,959.32 | 18.01 |
| 1988 | 2,219.67 | 19.76 |
| 1989 | 2,490.27 | 20.32 |
| 1990 | 2,770.90 | 19.97 |
| 1991 | 3,005.27 | 19.88 |
| 1992 | 3,248.21 | 18.65 |
| 1993 | 3,516.21 | 17.22 |
| 1994 | 3,832.22 | 18.39 |
| 1995 | 4,186.21 | 18.47 |
| 1996 | 4,433.27 | 19.83 |
| 1997 | 4,372.45 | 23.28 |
| 1998 | 3,912.92 | 25.98 |
| 1999 | 4,086.28 | 24.40 |
| 2000 | 4,275.76 | 23.25 |

**Source: dxEcondata**

**Appendix 6.2: Australia's Exports of Dairy Products based on SITC (1975-2000)**

| Year | (02) milk and cream | | (022) milk and cream dry | | (023) butter | | (024) cheese and curd | |
|---|---|---|---|---|---|---|---|---|
| | Weight (mt) | Value (thousand U.S dollars) | Weight (mt) | Value (thousand U.S dollars) | Weight (mt) | Value (thousand U.S dollars) | Weight (mt) | Value (thousand U.S dollars) |
| 1975 | 144276 | 129637 | 132298 | 122570 | 61143 | 69474 | 31174 | 44486 |
| 1976 | 197306 | 113122 | 180759 | 103166 | 40723 | 52895 | 43742 | 57577 |
| 1977 | 137890 | 98385 | 122038 | 89929 | 36079 | 50403 | 44587 | 58847 |
| 1978 | 106567 | 89749 | 82539 | 75777 | 28594 | 48319 | 45161 | 66749 |
| 1979 | 140846 | 129705 | 107772 | 109729 | 30862 | 51616 | 60492 | 94469 |
| 1980 | 112058 | 131217 | 78498 | 108181 | 21922 | 44307 | 61649 | 120846 |
| 1981 | 101179 | 154993 | 74604 | 133413 | 7587 | 21341 | 49731 | 114444 |
| 1982 | 135995 | 162924 | 68482 | 107898 | 12460 | 7651 | 77701 | 145557 |
| 1983 | 138973 | 148943 | 56869 | 86779 | 11219 | 6343 | 65156 | 120113 |
| 1984 | 138383 | 130432 | 49278 | 68691 | 29749 | 52448 | 71268 | 124330 |
| 1985 | 169611 | 128248 | 56190 | 61062 | 42989 | 59169 | 89620 | 124004 |
| 1986 | 162768 | 133087 | 135526 | 113577 | 44899 | 54558 | 73747 | 107267 |
| 1987 | 172617 | 163051 | 140494 | 147142 | 28867 | 38649 | 76294 | 120097 |
| 1988 | 169111 | 214066 | 128756 | 184789 | 37450 | 48963 | 74971 | 136480 |
| 1989 | 181795 | 289931 | 137824 | 257915 | 33941 | 53350 | 75322 | 156075 |
| 1990 | 221640 | 325707 | 156847 | 277486 | 49569 | 91951 | 66435 | 148705 |
| 1991 | 263746 | 331163 | 184691 | 276000 | 50621 | 82268 | 75111 | 167983 |
| 1992 | 288302 | 402043 | 190190 | 326849 | 51328 | 85948 | 88866 | 205550 |
| 1993 | 301474 | 427541 | 203097 | 353909 | 69606 | 109632 | 100710 | 231383 |
| 1994 | 441676 | 597552 | 311134 | 495749 | 85657 | 126418 | 123176 | 282863 |
| 1995 | 398375 | 624768 | 250594 | 495873 | 81914 | 118445 | 133950 | 329530 |
| 1996 | 481697 | 810103 | 308674 | 645728 | 83781 | 160703 | 135257 | 368317 |
| 1997 | 486166 | 751700 | 313985 | 600700 | 116184 | 182763 | 149974 | 388400 |
| 1998 | 528646 | 717300 | 356833 | 581100 | 99761 | 170699 | 182038 | 428300 |
| 1999 | 594142 | 744300 | 396971 | 594900 | 145164 | 184704 | 208231 | 463000 |
| 2000 | 598399 | 856300 | 423182 | 716800 | 114849 | 169032 | 232735 | 525600 |

**Source: the United Nations, 1975-2000, international Trade Statistics Yearbook and FAO, 1975-2000, FAO Trade Yearbook.**

**Appendix 6.3: Australia's Export Unit Value calculated using data from Appendix 6.2**

| Year | (02) milk and cream | (022) milk and cream dry | (023) butter | (024) cheese and curd |
|------|------|------|------|------|
| 1975 | 898.53 | 926.47 | 1136.25 | 1427.02 |
| 1976 | 573.33 | 570.74 | 1298.90 | 1316.29 |
| 1977 | 713.50 | 736.89 | 1397.02 | 1319.82 |
| 1978 | 842.18 | 918.07 | 1689.83 | 1478.02 |
| 1979 | 920.90 | 1018.16 | 1672.48 | 1561.68 |
| 1980 | 1170.97 | 1378.14 | 2021.12 | 1960.23 |
| 1981 | 1531.87 | 1788.28 | 2812.84 | 2301.26 |
| 1982 | 1198.01 | 1575.57 | 614.04 | 1873.30 |
| 1983 | 1071.74 | 1525.94 | 565.38 | 1843.47 |
| 1984 | 942.54 | 1393.95 | 1763.02 | 1744.54 |
| 1985 | 756.13 | 1086.70 | 1376.37 | 1383.66 |
| 1986 | 817.65 | 838.04 | 1215.13 | 1454.53 |
| 1987 | 944.58 | 1047.39 | 1338.86 | 1574.13 |
| 1988 | 1265.83 | 1435.19 | 1307.42 | 1820.44 |
| 1989 | 1594.82 | 1871.33 | 1571.84 | 2072.10 |
| 1990 | 1469.53 | 1769.15 | 1855.01 | 2238.35 |
| 1991 | 1255.61 | 1494.39 | 1625.17 | 2236.46 |
| 1992 | 1394.52 | 1718.54 | 1674.48 | 2313.03 |
| 1993 | 1418.17 | 1742.56 | 1575.04 | 2297.52 |
| 1994 | 1352.92 | 1593.36 | 1475.86 | 2296.41 |
| 1995 | 1568.29 | 1978.79 | 1445.97 | 2460.10 |
| 1996 | 1681.77 | 2091.94 | 1918.13 | 2723.09 |
| 1997 | 1546.18 | 1913.15 | 1573.05 | 2589.78 |
| 1998 | 1356.86 | 1628.49 | 1711.08 | 2352.80 |
| 1999 | 1252.73 | 1498.60 | 1272.38 | 2223.49 |
| 2000 | 1430.98 | 1693.83 | 1471.78 | 2258.36 |

**Appendix 6.4: Australia's Export Price Indexes calculated using data from Appendix 6.3**

| Year | (02) milk and cream (Value) | (022) milk and cream dry (Value) | (023) butter (Value) | (024) cheese and curd (Value) |
|------|------|------|------|------|
| 1975 | 100 | 100 | 100 | 100 |
| 1976 | 63.81 | 61.60 | 114.31 | 92.24 |
| 1977 | 79.41 | 79.54 | 122.95 | 92.49 |
| 1978 | 93.73 | 99.09 | 148.72 | 103.57 |
| 1979 | 102.49 | 109.90 | 147.19 | 109.44 |
| 1980 | 130.32 | 148.75 | 177.88 | 137.36 |
| 1981 | 170.49 | 193.02 | 247.55 | 161.26 |
| 1982 | 133.33 | 170.06 | 54.04 | 131.27 |
| 1983 | 119.28 | 164.70 | 49.76 | 129.18 |
| 1984 | 104.90 | 150.46 | 155.16 | 122.25 |
| 1985 | 84.15 | 117.29 | 121.13 | 96.96 |
| 1986 | 91.00 | 90.45 | 106.94 | 101.93 |
| 1987 | 105.12 | 113.05 | 117.83 | 110.31 |
| 1988 | 140.88 | 154.91 | 115.06 | 127.57 |
| 1989 | 177.49 | 201.98 | 138.33 | 145.20 |
| 1990 | 163.55 | 190.96 | 163.26 | 156.85 |
| 1991 | 139.74 | 161.30 | 143.03 | 156.72 |
| 1992 | 155.20 | 185.49 | 147.37 | 162.09 |
| 1993 | 157.83 | 188.09 | 138.62 | 161.00 |
| 1994 | 150.57 | 171.98 | 129.89 | 160.92 |
| 1995 | 174.54 | 213.58 | 127.26 | 172.39 |
| 1996 | 187.17 | 225.80 | 168.81 | 190.82 |
| 1997 | 172.08 | 206.50 | 138.44 | 181.48 |
| 1998 | 151.01 | 175.77 | 150.59 | 164.87 |
| 1999 | 139.42 | 161.75 | 111.98 | 155.81 |
| 2000 | 159.26 | 182.83 | 129.53 | 158.26 |

**Appendix 6.5: New Zealand's Exports of Dairy Products based on SITC (1975-2000)**

| Year | (02) milk and cream | | (022) milk and cream dry | | (023) butter | | (024) cheese and curd | |
|---|---|---|---|---|---|---|---|---|
| | Weight (mt) | Value (thousand U.S dollars) | Weight (mt) | Value (thousand U.S dollars) | Weight (mt) | Value (thousand U.S dollars) | Weight (mt) | Value (thousand U.S dollars) |
| 1975 | 153616 | 115984 | 145032 | 110775 | 180259 | 200246 | 76608 | 82377 |
| 1976 | 197746 | 91464 | 191749 | 88313 | 213688 | 226946 | 79345 | 80950 |
| 1977 | 257232 | 125094 | 249541 | 121265 | 195111 | 246949 | 73858 | 77826 |
| 1978 | 238239 | 143368 | 229102 | 137968 | 186529 | 278937 | 61494 | 73009 |
| 1979 | 240179 | 166427 | 227790 | 158603 | 212854 | 324473 | 66526 | 87701 |
| 1980 | 275406 | 257839 | 261475 | 247973 | 213215 | 347193 | 76067 | 126908 |
| 1981 | 251693 | 284609 | 230848 | 267558 | 198106 | 419237 | 86186 | 141689 |
| 1982 | 296371 | 351747 | 277810 | 336018 | 238538 | 509426 | 77878 | 145216 |
| 1983 | 285125 | 280350 | 268585 | 267937 | 181078 | 364436 | 82627 | 138317 |
| 1984 | 304965 | 263697 | 289322 | 253200 | 191428 | 326758 | 87360 | 131098 |
| 1985 | 349121 | 284562 | 329120 | 272087 | 249648 | 331352 | 87579 | 131736 |
| 1986 | 372002 | 322735 | 350396 | 308972 | 207892 | 264029 | 102736 | 148828 |
| 1987 | 342038 | 336970 | 320397 | 323357 | 217741 | 306363 | 104436 | 166425 |
| 1988 | 363721 | 496014 | 320548 | 449274 | 237194 | 362336 | 98935 | 187811 |
| 1989 | 308171 | 568432 | 279972 | 528745 | 167136 | 335297 | 84333 | 192286 |
| 1990 | 383872 | 658835 | 340767 | 602828 | 202739 | 389271 | 95825 | 209063 |
| 1991 | 442300 | 691616 | 404706 | 646735 | 244856 | 429485 | 109169 | 222078 |
| 1992 | 408094 | 701185 | 369847 | 651291 | 180205 | 364152 | 114656 | 251910 |
| 1993 | 436494 | 794032 | 400968 | 747176 | 248660 | 448922 | 126499 | 276267 |
| 1994 | 516609 | 844909 | 457353 | 777068 | 251671 | 469472 | 159353 | 34439 |
| 1995 | 443412 | 882412 | 389323 | 807056 | 233273 | 510606 | 168793 | 394127 |
| 1996 | 564696 | 1175135 | 488430 | 1071585 | 274250 | 624378 | 204718 | 507668 |
| 1997 | 649564 | 1202100 | 548121 | 1078200 | 328319 | 626100 | 237203 | 563500 |
| 1998 | 658850 | 1018900 | 550489 | 910500 | 311218 | 576200 | 249120 | 520100 |
| 1999 | 670016 | 968900 | 568652 | 869000 | 339181 | 514500 | 256236 | 509800 |
| 2000 | 656506 | 1105100 | 567869 | 999400 | 345111 | 507800 | 246153 | 496300 |

**Source: the United Nations, 1975-2000, international Trade Statistics Yearbook and FAO, 1975-2000, FAO Trade Yearbook.**

**Appendix 6.6: New Zealand's Export Unit Value calculated using data from Appendix 6.5**

| Year | (02) milk and cream | (022) milk and cream dry | (023) butter | (024) cheese and curd |
|------|---------------------|--------------------------|--------------|------------------------|
| 1975 | 755.02 | 763.80 | 1110.88 | 1075.30 |
| 1976 | 462.53 | 460.56 | 1062.04 | 1020.23 |
| 1977 | 486.31 | 485.95 | 1265.68 | 1053.72 |
| 1978 | 601.78 | 602.21 | 1495.41 | 1187.25 |
| 1979 | 692.93 | 696.27 | 1524.39 | 1318.30 |
| 1980 | 936.21 | 948.36 | 1628.37 | 1668.37 |
| 1981 | 1130.78 | 1159.02 | 2116.22 | 1643.99 |
| 1982 | 1186.85 | 1209.52 | 2135.62 | 1864.66 |
| 1983 | 983.25 | 997.59 | 2012.59 | 1673.99 |
| 1984 | 864.68 | 875.15 | 1706.95 | 1500.66 |
| 1985 | 815.08 | 826.71 | 1327.28 | 1504.20 |
| 1986 | 867.56 | 881.78 | 1270.03 | 1448.64 |
| 1987 | 985.18 | 1009.24 | 1407.01 | 1593.56 |
| 1988 | 1363.72 | 1401.58 | 1527.59 | 1898.33 |
| 1989 | 1844.53 | 1888.56 | 2006.13 | 2280.08 |
| 1990 | 1716.29 | 1769.03 | 1920.06 | 2181.72 |
| 1991 | 1563.68 | 1598.04 | 1754.03 | 2034.26 |
| 1992 | 1718.19 | 1760.97 | 2020.76 | 2197.09 |
| 1993 | 1819.11 | 1863.43 | 1805.36 | 2183.95 |
| 1994 | 1635.49 | 1699.05 | 1865.42 | 216.12 |
| 1995 | 1990.05 | 2072.97 | 2188.88 | 2334.97 |
| 1996 | 2081.00 | 2193.94 | 2276.67 | 2479.84 |
| 1997 | 1850.63 | 1967.08 | 1906.99 | 2375.60 |
| 1998 | 1546.48 | 1653.98 | 1851.43 | 2087.75 |
| 1999 | 1446.08 | 1528.17 | 1516.89 | 1989.57 |
| 2000 | 1683.30 | 1759.91 | 1471.41 | 2016.22 |

**Appendix 6.7: New Zealand's Export Price Indexes calculated using data from Appendix 6.6**

| Year | (02) milk and cream (Value) | (022) milk and cream dry (Value) | (023) butter (Value) | (024) cheese and curd (Value) |
|------|------|------|------|------|
| 1975 | 100 | 100 | 100 | 100 |
| 1976 | 61.26 | 60.30 | 95.60 | 94.88 |
| 1977 | 64.41 | 63.62 | 113.93 | 97.99 |
| 1978 | 79.70 | 78.84 | 134.61 | 110.41 |
| 1979 | 91.78 | 91.16 | 137.22 | 122.60 |
| 1980 | 124.00 | 124.16 | 146.58 | 155.15 |
| 1981 | 149.77 | 151.74 | 190.50 | 152.89 |
| 1982 | 157.19 | 158.35 | 192.24 | 173.41 |
| 1983 | 130.23 | 130.61 | 181.17 | 155.68 |
| 1984 | 114.52 | 114.58 | 153.66 | 139.56 |
| 1985 | 107.95 | 108.24 | 119.48 | 139.89 |
| 1986 | 114.90 | 115.45 | 114.33 | 134.72 |
| 1987 | 130.48 | 132.13 | 126.66 | 148.20 |
| 1988 | 180.62 | 183.50 | 137.51 | 176.54 |
| 1989 | 244.30 | 247.26 | 180.59 | 212.04 |
| 1990 | 227.32 | 231.61 | 172.84 | 202.89 |
| 1991 | 207.10 | 209.22 | 157.89 | 189.18 |
| 1992 | 227.57 | 230.55 | 181.91 | 204.32 |
| 1993 | 240.93 | 243.97 | 162.52 | 203.10 |
| 1994 | 216.61 | 222.45 | 167.92 | 20.10 |
| 1995 | 263.57 | 271.40 | 197.04 | 217.14 |
| 1996 | 275.62 | 287.24 | 204.94 | 230.62 |
| 1997 | 245.11 | 257.54 | 171.66 | 220.92 |
| 1998 | 204.83 | 216.55 | 166.66 | 194.15 |
| 1999 | 191.53 | 200.07 | 136.55 | 185.02 |
| 2000 | 222.95 | 230.41 | 132.45 | 187.50 |

**Appendix 6.8: Netherlands's Exports of Dairy Products based on SITC (1975-2000)**

| Year | (02) milk and cream | | (022) milk and cream dry | | (023) butter | | (024) cheese and curd | |
|---|---|---|---|---|---|---|---|---|
| | Weight (mt) | Value (thousand U.S dollars) | Weight (mt) | Value (thousand U.S dollars) | Weight (mt) | Value (thousand U.S dollars) | Weight (mt) | Value (thousand U.S dollars) |
| 1975 | 605507 | 473241 | 200673 | 212521 | 179686 | 369184 | 225653 | 445448 |
| 1976 | 765600 | 598136 | 325132 | 328271 | 189785 | 404990 | 247780 | 474627 |
| 1977 | 727093 | 580791 | 258662 | 273093 | 163760 | 343970 | 255091 | 556138 |
| 1978 | 784206 | 781154 | 304417 | 420992 | 184645 | 461096 | 249058 | 613929 |
| 1979 | 898903 | 839239 | 358267 | 403425 | 264869 | 622284 | 286143 | 738078 |
| 1980 | 926163 | 1041461 | 332975 | 509120 | 245637 | 622977 | 275298 | 801438 |
| 1981 | 995505 | 1139942 | 347387 | 586930 | 267922 | 766321 | 307598 | 781329 |
| 1982 | 999604 | 1161683 | 368960 | 604866 | 271502 | 781704 | 317448 | 776130 |
| 1983 | 926230 | 995856 | 329222 | 494781 | 266416 | 686108 | 326398 | 737780 |
| 1984 | 957303 | 892876 | 325464 | 438753 | 266326 | 535779 | 338523 | 721279 |
| 1985 | 957513 | 865219 | 308513 | 407668 | 254292 | 444466 | 355717 | 755229 |
| 1986 | 926654 | 1095039 | 368181 | 580427 | 234662 | 474177 | 375826 | 1042232 |
| 1987 | 954066 | 1126879 | 404686 | 580668 | 392647 | 582834 | 382662 | 1342123 |
| 1988 | 1047992 | 1460619 | 502189 | 884333 | 444054 | 781326 | 399537 | 1516717 |
| 1989 | 996113 | 1442617 | 416013 | 876569 | 291806 | 767270 | 419916 | 1529499 |
| 1990 | 943497 | 1410188 | 406483 | 915461 | 174090 | 541061 | 433232 | 1783179 |
| 1991 | 870696 | 1191557 | 305381 | 619683 | 248813 | 623004 | 472704 | 1930052 |
| 1992 | 873594 | 1340373 | 329847 | 751046 | 242585 | 702677 | 498026 | 2159485 |
| 1993 | 971489 | 1528445 | 334175 | 737630 | 255510 | 782007 | 469665 | 2052980 |
| 1994 | 857758 | 1277290 | 257208 | 614268 | 168284 | 524049 | 486133 | 2028500 |
| 1995 | 975889 | 1686711 | 365251 | 924437 | 186670 | 652015 | 502057 | 2272698 |
| 1996 | 902227 | 1460439 | 260535 | 674969 | 163243 | 565494 | 525291 | 2288425 |
| 1997 | 829082 | 1210500 | 258327 | 595866 | 163065 | 490192 | 455184 | 1747500 |
| 1998 | 924343 | 1273000 | 252141 | 575118 | 161336 | 498840 | 472719 | 1892600 |
| 1999 | 1044424 | 1244700 | 287525 | 583462 | 167500 | 471410 | 453593 | 1662200 |
| 2000 | 1163249 | 1238100 | 289939 | 241658 | 119076 | 163314 | 477804 | 1509700 |

**Source: the United Nations, 1975-2000, international Trade Statistics Yearbook and FAO, 1975-2000, FAO Trade Yearbook.**

**Appendix 6.9: Netherlands' Export Unit Value calculated using data from Appendix 6.8**

| Year | (02) milk and cream | (022) milk and cream dry | (023) butter | (024) cheese and curd |
|------|--------------------|--------------------------|--------------|------------------------|
| 1975 | 781.56 | 1059.04 | 2054.61 | 1974.04 |
| 1976 | 781.26 | 1009.65 | 2133.94 | 1915.52 |
| 1977 | 798.78 | 1055.79 | 2100.45 | 2180.15 |
| 1978 | 996.11 | 1382.94 | 2497.20 | 2465.00 |
| 1979 | 933.62 | 1126.04 | 2349.40 | 2579.40 |
| 1980 | 1124.49 | 1529.00 | 2536.17 | 2911.16 |
| 1981 | 1145.09 | 1689.56 | 2860.24 | 2540.10 |
| 1982 | 1162.14 | 1639.38 | 2879.18 | 2444.90 |
| 1983 | 1075.17 | 1502.88 | 2575.33 | 2260.37 |
| 1984 | 932.70 | 1348.08 | 2011.74 | 2130.66 |
| 1985 | 903.61 | 1321.40 | 1747.86 | 2123.12 |
| 1986 | 1181.71 | 1576.47 | 2020.68 | 2773.18 |
| 1987 | 1181.13 | 1434.86 | 1484.37 | 3507.33 |
| 1988 | 1393.73 | 1760.96 | 1759.53 | 3796.19 |
| 1989 | 1448.25 | 2107.07 | 2629.38 | 3642.39 |
| 1990 | 1494.64 | 2252.15 | 3107.92 | 4115.99 |
| 1991 | 1368.51 | 2029.21 | 2503.90 | 4083.00 |
| 1992 | 1534.32 | 2276.95 | 2896.62 | 4336.09 |
| 1993 | 1573.30 | 2207.32 | 3060.57 | 4371.16 |
| 1994 | 1489.10 | 2388.21 | 3114.07 | 4172.72 |
| 1995 | 1728.38 | 2530.96 | 3492.87 | 4526.77 |
| 1996 | 1618.70 | 2590.70 | 3464.12 | 4356.49 |
| 1997 | 1460.05 | 2306.63 | 3006.11 | 3839.11 |
| 1998 | 1377.19 | 2280.94 | 3091.93 | 4003.65 |
| 1999 | 1191.76 | 2029.26 | 2814.39 | 3664.52 |
| 2000 | 1064.35 | 833.48 | 1371.51 | 3159.66 |

**Appendix 6.10: Netherlands' Export Price Indexes calculated using data from Appendix 6.9**

| Year | (02) milk and cream (Value) | (022) milk and cream dry (Value) | (023) butter (Value) | (024) cheese and curd (Value) |
|------|------|------|------|------|
| 1975 | 100 | 100 | 100 | 100 |
| 1976 | 99.96 | 95.34 | 103.86 | 97.03 |
| 1977 | 102.20 | 99.69 | 102.23 | 110.44 |
| 1978 | 127.45 | 130.58 | 121.54 | 124.87 |
| 1979 | 119.46 | 106.33 | 114.35 | 130.67 |
| 1980 | 143.88 | 144.38 | 123.44 | 147.47 |
| 1981 | 146.51 | 159.54 | 139.21 | 128.67 |
| 1982 | 148.69 | 154.80 | 140.13 | 123.85 |
| 1983 | 137.57 | 141.91 | 125.34 | 114.50 |
| 1984 | 119.34 | 127.29 | 97.91 | 107.93 |
| 1985 | 115.62 | 124.77 | 85.07 | 107.55 |
| 1986 | 151.20 | 148.86 | 98.35 | 140.48 |
| 1987 | 151.12 | 135.49 | 72.24 | 177.67 |
| 1988 | 178.33 | 166.28 | 85.64 | 192.30 |
| 1989 | 185.30 | 198.96 | 127.97 | 184.51 |
| 1990 | 191.24 | 212.66 | 151.26 | 208.50 |
| 1991 | 175.10 | 191.61 | 121.87 | 206.83 |
| 1992 | 196.31 | 215.00 | 140.98 | 219.65 |
| 1993 | 201.30 | 208.43 | 148.96 | 221.43 |
| 1994 | 190.53 | 225.51 | 151.56 | 211.38 |
| 1995 | 221.14 | 238.99 | 170.00 | 229.31 |
| 1996 | 207.11 | 244.63 | 168.60 | 220.69 |
| 1997 | 186.81 | 217.80 | 146.31 | 194.48 |
| 1998 | 176.21 | 215.38 | 150.49 | 202.81 |
| 1999 | 152.48 | 191.61 | 136.98 | 185.63 |
| 2000 | 136.18 | 78.70 | 66.75 | 160.06 |

**Appendix 6.11: Denmark's Exports of Dairy Products based on SITC (1975-2000)**

| Year | (02) milk and cream | | (022) milk and cream dry | | (023) butter | | (024) cheese and curd | |
|------|---------------------|----------------------|--------------------------|----------------------|-------------------|----------------------|-----------------------|----------------------|
| | Weight (mt) | Value (thousand U.S dollars) | Weight (mt) | Value (thousand U.S dollars) | Weight (mt) | Value (thousand U.S dollars) | Weight (mt) | Value (thousand U.S dollars) |
| 1975 | 96760 | 91498 | 52923 | 70306 | 98086 | 190133 | 100133 | 197965 |
| 1976 | 142211 | 110610 | 80466 | 85605 | 91842 | 180952 | 116198 | 223749 |
| 1977 | 139513 | 113550 | 86101 | 90629 | 89755 | 173351 | 125394 | 257459 |
| 1978 | 170161 | 160064 | 103050 | 125665 | 88487 | 224507 | 131972 | 307810 |
| 1979 | 156899 | 165354 | 106431 | 130226 | 82931 | 233252 | 145671 | 358678 |
| 1980 | 147496 | 190415 | 92326 | 148835 | 72237 | 252259 | 173064 | 405569 |
| 1981 | 127322 | 181672 | 72727 | 141350 | 71431 | 23711 | 195517 | 410938 |
| 1982 | 155401 | 212806 | 96315 | 169050 | 74978 | 217191 | 208219 | 412462 |
| 1983 | 145804 | 177998 | 89212 | 142990 | 80925 | 219349 | 214794 | 389373 |
| 1984 | 153508 | 184003 | 106695 | 157948 | 66201 | 155956 | 258911 | 393521 |
| 1985 | 165972 | 187412 | 110263 | 158822 | 59352 | 138161 | 212652 | 365440 |
| 1986 | 156236 | 230200 | 105532 | 194906 | 66090 | 171155 | 209265 | 442728 |
| 1987 | 168274 | 243854 | 106741 | 193225 | 69545 | 184175 | 225651 | 526536 |
| 1988 | 159952 | 233184 | 86272 | 171859 | 59456 | 186932 | 206135 | 536897 |
| 1989 | 162068 | 284910 | 91913 | 229980 | 55013 | 186641 | 228400 | 550657 |
| 1990 | 168695 | 352762 | 108497 | 288312 | 50341 | 186064 | 232937 | 690065 |
| 1991 | 169258 | 326613 | 107823 | 250163 | 48862 | 184377 | 244047 | 700940 |
| 1992 | 162106 | 344011 | 106498 | 273708 | 47792 | 191225 | 226650 | 743483 |
| 1993 | 166297 | 348050 | 98843 | 250224 | 47982 | 155677 | 260043 | 813146 |
| 1994 | 177660 | 376092 | 119877 | 306006 | 49412 | 169969 | 236773 | 808390 |
| 1995 | 168191 | 398534 | 105082 | 305998 | 50978 | 190460 | 254974 | 1011443 |
| 1996 | 158665 | 376298 | 104759 | 297851 | 54593 | 199404 | 241724 | 998742 |
| 1997 | 168783 | 379600 | 108812 | 296011 | 43770 | 137532 | 250467 | 965200 |
| 1998 | 154650 | 345600 | 104612 | 269963 | 43050 | 152453 | 239581 | 949000 |
| 1999 | 159540 | 319700 | 106317 | 238756 | 39663 | 139663 | 236801 | 916100 |
| 2000 | 178075 | 311600 | 93328 | 206346 | 40132 | 40994 | 250778 | 858100 |

**Source: the United Nations, 1975-2000, international Trade Statistics Yearbook and FAO, 1975-2000, FAO Trade Yearbook.**

**Appendix 6.12: Denmark's Export Unit Value calculated using data from Appendix 6.11**

| Year | (02) milk and cream | (022) milk and cream dry | (023) butter | (024) cheese and curd |
|---|---|---|---|---|
| 1975 | 945.62 | 1328.46 | 1938.43 | 1977.02 |
| 1976 | 777.79 | 1063.86 | 1970.25 | 1925.58 |
| 1977 | 813.90 | 1052.59 | 1931.38 | 2053.20 |
| 1978 | 940.66 | 1219.46 | 2537.17 | 2332.39 |
| 1979 | 1053.89 | 1223.57 | 2812.60 | 2462.25 |
| 1980 | 1290.98 | 1612.06 | 3492.10 | 2343.46 |
| 1981 | 1426.87 | 1943.57 | 331.94 | 2101.80 |
| 1982 | 1369.40 | 1755.18 | 2896.73 | 1980.90 |
| 1983 | 1220.80 | 1602.81 | 2710.52 | 1812.77 |
| 1984 | 1198.65 | 1480.37 | 2355.79 | 1519.91 |
| 1985 | 1129.18 | 1440.39 | 2327.82 | 1718.49 |
| 1986 | 1473.41 | 1846.89 | 2589.73 | 2115.63 |
| 1987 | 1449.15 | 1810.22 | 2648.28 | 2333.45 |
| 1988 | 1457.84 | 1992.06 | 3144.04 | 2604.59 |
| 1989 | 1757.96 | 2502.15 | 3392.67 | 2410.93 |
| 1990 | 2091.12 | 2657.33 | 3696.07 | 2962.45 |
| 1991 | 1929.67 | 2320.13 | 3773.42 | 2872.15 |
| 1992 | 2122.14 | 2570.08 | 4001.19 | 3280.31 |
| 1993 | 2092.94 | 2531.53 | 3244.49 | 3126.97 |
| 1994 | 2116.92 | 2552.67 | 3439.83 | 3414.20 |
| 1995 | 2369.53 | 2911.99 | 3736.12 | 3966.85 |
| 1996 | 2371.65 | 2843.20 | 3652.56 | 4131.74 |
| 1997 | 2249.04 | 2720.39 | 3142.15 | 3853.60 |
| 1998 | 2234.72 | 2580.61 | 3541.30 | 3961.08 |
| 1999 | 2003.89 | 2245.70 | 3521.24 | 3868.65 |
| 2000 | 1749.82 | 2210.98 | 1021.48 | 3421.75 |

**Appendix 6.13: Denmark's Export Price Indexes calculated using data from Appendix 6.12**

| Year | (02) milk and cream (Value) | (022) milk and cream dry (Value) | (023) butter (Value) | (024) cheese and curd (Value) |
|---|---|---|---|---|
| 1975 | 100 | 100 | 100 | 100 |
| 1976 | 82.25 | 80.08 | 101.64 | 97.40 |
| 1977 | 86.07 | 79.23 | 99.64 | 103.85 |
| 1978 | 99.47 | 91.79 | 130.89 | 117.97 |
| 1979 | 111.45 | 92.10 | 145.10 | 124.54 |
| 1980 | 136.52 | 121.35 | 180.15 | 118.53 |
| 1981 | 150.89 | 146.30 | 17.12 | 106.31 |
| 1982 | 144.81 | 132.12 | 149.44 | 100.20 |
| 1983 | 129.10 | 120.65 | 139.83 | 91.69 |
| 1984 | 126.76 | 111.43 | 121.53 | 76.89 |
| 1985 | 119.41 | 108.42 | 120.09 | 86.92 |
| 1986 | 155.81 | 139.02 | 133.60 | 107.01 |
| 1987 | 153.25 | 136.26 | 136.62 | 118.03 |
| 1988 | 154.17 | 149.95 | 162.19 | 131.74 |
| 1989 | 185.90 | 188.35 | 175.02 | 121.95 |
| 1990 | 221.14 | 200.03 | 190.67 | 149.84 |
| 1991 | 204.06 | 174.65 | 194.66 | 145.28 |
| 1992 | 224.42 | 193.46 | 206.41 | 165.92 |
| 1993 | 221.32 | 190.56 | 167.38 | 158.16 |
| 1994 | 223.86 | 192.15 | 177.45 | 172.69 |
| 1995 | 250.58 | 219.20 | 192.74 | 200.65 |
| 1996 | 250.80 | 214.02 | 188.43 | 208.99 |
| 1997 | 237.84 | 204.78 | 162.10 | 194.92 |
| 1998 | 236.32 | 194.25 | 182.69 | 200.36 |
| 1999 | 211.91 | 169.04 | 181.65 | 195.68 |
| 2000 | 185.04 | 166.43 | 52.70 | 173.08 |

**Appendix 6.14: Ireland's Exports of Dairy Products based on SITC (1975-2000)**

| Year | (02) milk and cream | | (022) milk and cream dry | | (023) butter | | (024) cheese and curd | |
|---|---|---|---|---|---|---|---|---|
| | Weight (mt) | Value (thousand U.S dollars) | Weight (mt) | Value (thousand U.S dollars) | Weight (mt) | Value (thousand U.S dollars) | Weight (mt) | Value (thousand U.S dollars) |
| 1975 | 141321 | 130454 | 128926 | 126944 | 57156 | 99539 | 56934 | 106424 |
| 1976 | 170879 | 147772 | 159432 | 144766 | 67296 | 122732 | 56254 | 87890 |
| 1977 | 198889 | 161847 | 191692 | 158726 | 51008 | 105508 | 38745 | 66954 |
| 1978 | 187200 | 161521 | 177000 | 154461 | 83405 | 223309 | 42081 | 89921 |
| 1979 | 215975 | 183673 | 199346 | 173154 | 118721 | 320550 | 60577 | 164769 |
| 1980 | 186785 | 210627 | 170868 | 199073 | 90454 | 259471 | 37826 | 120818 |
| 1981 | 173481 | 224914 | 156736 | 214007 | 80890 | 245914 | 44007 | 129509 |
| 1982 | 142122 | 178081 | 120734 | 167363 | 79612 | 234977 | 44514 | 116191 |
| 1983 | 134748 | 151037 | 104588 | 137424 | 81884 | 221933 | 49082 | 116925 |
| 1984 | 273231 | 243171 | 237404 | 230398 | 118234 | 269646 | 54411 | 120138 |
| 1985 | 270627 | 209158 | 229836 | 194183 | 104575 | 221673 | 64890 | 140997 |
| 1986 | 199964 | 229092 | 159242 | 211358 | 78455 | 223964 | 66705 | 177307 |
| 1987 | 206653 | 268574 | 156018 | 243622 | 141503 | 480300 | 56755 | 173662 |
| 1988 | 194344 | 268378 | 115525 | 212287 | 171653 | 509572 | 74007 | 251362 |
| 1989 | 228027 | 383888 | 152230 | 326722 | 154152 | 522355 | 61440 | 212534 |
| 1990 | 180633 | 302960 | 106279 | 237418 | 67847 | 252475 | 72254 | 287756 |
| 1991 | 182565 | 275301 | 96926 | 208084 | 135055 | 460775 | 70531 | 255955 |
| 1992 | 433390 | 751367 | 283721 | 653821 | 159238 | 556395 | 97911 | 388961 |
| 1993 | 277731 | 442551 | 158826 | 356553 | 108728 | 398716 | 117251 | 271294 |
| 1994 | 297040 | 408381 | 125565 | 298009 | 110324 | 393757 | 89358 | 329485 |
| 1995 | 404661 | 674315 | 184976 | 508944 | 137980 | 583589 | 76953 | 312923 |
| 1996 | 305944 | 383635 | 94469 | 249051 | 118716 | 439301 | 94727 | 384308 |
| 1997 | 334826 | 453600 | 136256 | 314679 | 138576 | 478700 | 81656 | 314020 |
| 1998 | 313346 | 335800 | 94170 | 204437 | 135414 | 481800 | 85663 | 309276 |
| 1999 | 359208 | 383700 | 129488 | 263581 | 126110 | 384600 | 86135 | 289951 |
| 2000 | 391739 | 443500 | 171497 | 325226 | 118744 | 321200 | 89278 | 267655 |

**Source: the United Nations, 1975-2000, international Trade Statistics Yearbook and FAO, 1975-2000, FAO Trade Yearbook.**

**Appendix 6.15: Ireland's Export Unit Value calculated using data from Appendix 6.14**

| Year | (02) milk and cream | (022) milk and cream dry | (023) butter | (024) cheese and curd |
|------|---------------------|--------------------------|--------------|------------------------|
| 1975 | 923.10 | 984.63 | 1741.53 | 1869.25 |
| 1976 | 864.77 | 908.01 | 1823.76 | 1562.38 |
| 1977 | 813.75 | 828.03 | 2068.46 | 1728.09 |
| 1978 | 862.82 | 872.66 | 2677.40 | 2136.85 |
| 1979 | 850.44 | 868.61 | 2700.03 | 2719.99 |
| 1980 | 1127.64 | 1165.07 | 2868.54 | 3194.05 |
| 1981 | 1296.48 | 1365.40 | 3040.10 | 2942.92 |
| 1982 | 1253.01 | 1386.21 | 2951.53 | 2610.21 |
| 1983 | 1120.88 | 1313.95 | 2710.33 | 2382.24 |
| 1984 | 889.98 | 970.49 | 2280.61 | 2207.97 |
| 1985 | 772.86 | 844.88 | 2119.75 | 2172.86 |
| 1986 | 1145.67 | 1327.27 | 2854.68 | 2658.08 |
| 1987 | 1299.64 | 1561.50 | 3394.27 | 3059.85 |
| 1988 | 1380.94 | 1837.58 | 2968.62 | 3396.46 |
| 1989 | 1683.52 | 2146.24 | 3388.57 | 3459.21 |
| 1990 | 1677.21 | 2233.91 | 3721.24 | 3982.56 |
| 1991 | 1507.96 | 2146.83 | 3411.76 | 3628.97 |
| 1992 | 1733.70 | 2304.45 | 3494.11 | 3972.60 |
| 1993 | 1593.45 | 2244.93 | 3667.09 | 2313.79 |
| 1994 | 1374.83 | 2373.34 | 3569.09 | 3687.25 |
| 1995 | 1666.37 | 2751.40 | 4229.52 | 4066.42 |
| 1996 | 1253.94 | 2636.32 | 3700.44 | 4057.00 |
| 1997 | 1354.73 | 2309.47 | 3454.42 | 3845.64 |
| 1998 | 1071.66 | 2170.93 | 3557.98 | 3610.38 |
| 1999 | 1068.18 | 2035.56 | 3049.72 | 3366.24 |
| 2000 | 1132.13 | 1896.39 | 2704.98 | 2997.99 |

**Appendix 6.16: Ireland's Export Price Indexes calculated using data from Appendix 6.15**

| Year | (02) milk and cream (Value) | (022) milk and cream dry (Value) | (023) butter (Value) | (024) cheese and curd (Value) |
|---|---|---|---|---|
| 1975 | 100 | 100 | 100 | 100 |
| 1976 | 93.68 | 92.22 | 104.72 | 83.58 |
| 1977 | 88.15 | 84.09 | 118.77 | 92.45 |
| 1978 | 93.47 | 88.63 | 153.74 | 114.31 |
| 1979 | 92.13 | 88.22 | 155.04 | 145.51 |
| 1980 | 122.16 | 118.32 | 164.71 | 170.87 |
| 1981 | 140.45 | 138.67 | 174.56 | 157.44 |
| 1982 | 135.74 | 140.78 | 169.48 | 139.64 |
| 1983 | 121.42 | 133.45 | 155.63 | 127.44 |
| 1984 | 96.41 | 98.56 | 130.95 | 118.12 |
| 1985 | 83.72 | 85.81 | 121.72 | 116.24 |
| 1986 | 124.11 | 134.80 | 163.92 | 142.20 |
| 1987 | 140.79 | 158.59 | 194.90 | 163.69 |
| 1988 | 149.60 | 186.63 | 170.46 | 181.70 |
| 1989 | 182.38 | 217.97 | 194.57 | 185.06 |
| 1990 | 181.69 | 226.88 | 213.68 | 213.06 |
| 1991 | 163.36 | 218.03 | 195.90 | 194.14 |
| 1992 | 187.81 | 234.04 | 200.63 | 212.52 |
| 1993 | 172.62 | 228.00 | 210.57 | 123.78 |
| 1994 | 148.94 | 241.04 | 204.94 | 197.26 |
| 1995 | 180.52 | 279.43 | 242.86 | 217.54 |
| 1996 | 135.84 | 267.75 | 212.48 | 217.04 |
| 1997 | 146.76 | 234.55 | 198.35 | 205.73 |
| 1998 | 116.09 | 220.48 | 204.30 | 193.14 |
| 1999 | 115.72 | 206.73 | 175.12 | 180.08 |
| 2000 | 122.64 | 192.60 | 155.32 | 160.38 |

**Appendix 6.17: Australia's Exports of Dairy Products to Thailand by volume (1975-2000)**

(tonnes)

| Year | WMP | SMP | Butter and Butter Fat | Cheese |
|---|---|---|---|---|
| 1975 | 79 | 1150 | 11 | 7 |
| 1976 | 741 | 13466 | 105 | 36 |
| 1977 | 201 | 20900 | 123 | 41 |
| 1978 | 343 | 4600 | 280 | 43 |
| 1979 | 159 | 4500 | 102 | 34 |
| 1980 | 371 | 1103 | 106 | 83 |
| 1981 | 145 | 2815 | 66 | 68 |
| 1982 | 429 | 1530 | 662 | 42 |
| 1983 | 211 | 5423 | 1231 | 141 |
| 1984 | 513 | 10235 | 1659 | 193 |
| 1985 | 439 | 12788 | 1875* | 202 |
| 1986 | 836 | 12930 | 2087* | 205 |
| 1987 | 2348 | 14548 | 2470 | 138 |
| 1988 | 1457 | 12119 | 4193 | 259 |
| 1989 | 1409 | 3895 | 3829 | 286 |
| 1990 | 1035 | 15612 | 4700 | 422 |
| 1991 | 756 | 14462 | 6000 | 420 |
| 1992 | 1831 | 10975 | 9500 | 309 |
| 1993 | 1668 | 15568 | 10100 | 379 |
| 1994 | 2641 | 18774 | 9500 | 368 |
| 1995 | 3016 | 19180 | 12800 | 473 |
| 1996 | 6066 | 26370 | 12600 | 586 |
| 1997 | 7913 | 21634 | 9200 | 635 |
| 1998 | 8209 | 15938 | 8500 | 766 |
| 1999 | 10743 | 26746 | 7600 | 1266 |
| 2000 | 11573 | 24256 | 10100 | 775 |

* Estimated though interpolation.

**Source: Department of Primary Industry, Annual Report (1975-1981); Bureau of Agricultural Economics, Dairy Situation and Outlook (1977-1979); Bureau of Agricultural Economics, Commodity Statistical Bulletin (1985-1986); ADC, Dairy Compendium (1989-2000); ADI, In Focus (2000-2002); The Department of Thai Customs (1980-1985); ABARE (1995-2001);**

**Appendix 6.18: Australia's Real Exports (value) in U.S dollars**

| Year | (022) milk and cream dry (WMP;SMP) | (023) butter | (024) cheese and curd |
|------|-----------------------------------|--------------|----------------------|
| 1975 | 1138632 | 12498.75 | 9989.14 |
| 1976 | 13163155 | 119311.1 | 51372.98 |
| 1977 | 19548800 | 139758.8 | 58506.45 |
| 1978 | 4579695 | 318149.8 | 61364.16 |
| 1979 | 4316294 | 115899.8 | 48517.11 |
| 1980 | 1365633 | 120440 | 118447.2 |
| 1981 | 2742363 | 74993.92 | 97039.37 |
| 1982 | 1814972 | 752210.4 | 59936.47 |
| 1983 | 5219882 | 1398679 | 201214.8 |
| 1984 | 9957580 | 1885054 | 275416.1 |
| 1985 | 12254907 | 2130516 | 288262.5 |
| 1986 | 12754515 | 2371401 | 292532.8 |
| 1987 | 15653871 | 2806572 | 196926.8 |
| 1988 | 12577716 | 4764481 | 369596.3 |
| 1989 | 4914117 | 4350882 | 408140.9 |
| 1990 | 15422623 | 5340284 | 602221 |
| 1991 | 14098963 | 6817465 | 599357.6 |
| 1992 | 11864587 | 10794300 | 440944.1 |
| 1993 | 15968294 | 11475908 | 540844.8 |
| 1994 | 19840565 | 10794264 | 525154.7 |
| 1995 | 20564296 | 14543781 | 674997 |
| 1996 | 30050561 | 14316947 | 836249.2 |
| 1997 | 27374258 | 10453669 | 906166.1 |
| 1998 | 22371934 | 9658131 | 1093131 |
| 1999 | 34733240 | 8635549 | 1806648 |
| 2000 | 33193806 | 11476089 | 1105920 |

**Appendix 6.19: Average Export Price Indexes for Competing Countries[1]**

| Year | (022) milk and cream dry (WMP;SMP) | (023) butter | (024) cheese and curd |
|------|------|------|------|
| 1975 | 100 | 100 | 100 |
| 1976 | 81.98 | 101.45 | 93.22 |
| 1977 | 81.66 | 108.64 | 101.18 |
| 1978 | 97.46 | 135.19 | 116.89 |
| 1979 | 94.45 | 137.93 | 130.83 |
| 1980 | 127.05 | 153.72 | 148.00 |
| 1981 | 149.06 | 130.35 | 136.33 |
| 1982 | 146.51 | 162.82 | 134.27 |
| 1983 | 131.65 | 150.49 | 122.327 |
| 1984 | 112.96 | 126.01 | 110.62 |
| 1985 | 106.81 | 111.59 | 112.65 |
| 1986 | 134.53 | 127.55 | 131.10 |
| 1987 | 140.62 | 132.60 | 151.90 |
| 1988 | 171.59 | 138.95 | 170.57 |
| 1989 | 213.13 | 169.54 | 175.89 |
| 1990 | 217.79 | 182.11 | 193.57 |
| 1991 | 198.38 | 167.58 | 183.86 |
| 1992 | 218.26 | 182.48 | 200.60 |
| 1993 | 217.74 | 172.36 | 176.62 |
| 1994 | 220.29 | 175.47 | 150.36 |
| 1995 | 252.25 | 200.66 | 216.16 |
| 1996 | 253.41 | 193.61 | 219.33 |
| 1997 | 228.67 | 169.60 | 204.01 |
| 1998 | 211.66 | 176.03 | 197.61 |
| 1999 | 191.86 | 157.57 | 186.60 |
| 2000 | 167.03 | 101.80 | 170.25 |

Note: [1] Simple (unweighted) average export price indexes were derived based on export unit value indexes presented in Appendix 6.7 (New Zealand), Appendix 6.10 (Netherlands), Appendix 6.13 (Denmark) and Appendix 6.16 (Ireland).

**Appendix for Chapter 7**

The Questionnaire for Interviews:

'Factors Influencing Australia's Dairy Product Exports to Thailand'

(Export Managers)


Research Title: 'Factors Influencing Australia's Dairy Product Exports
to Thailand'

Name of Respondent:_____

Name of company:   _____

Date:_____            Time (start)_____

                                                          (finish)_____


1.   What are the types of dairy products exported by your company to Thailand?

        SMP_____                         WMP_____                              Butter_____

Cheese_____                    Yoghurt_____                         Whey _____

Milk and Cream_____                  Condensed/Evaporated Milk_____

Anhydrous Milk Fat (AMF)_____                  Other (Please specify)_____


2. What has been the average weight/value per year of your dairy product exports to
Thailand in the last five years (1999-2003)?

| Product | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|
| | tonnes/$'000 | tonnes/$'000 | tonnes/$'000 | tonnes/$'000 | tonnes/$'000 |
| SMP | _____ | _____ | _____ | _____ | _____ |
| WMP | _____ | _____ | _____ | _____ | _____ |
| Butter | _____ | _____ | _____ | _____ | _____ |
| Cheese | _____ | _____ | _____ | _____ | _____ |
| Yoghurt | _____ | _____ | _____ | _____ | _____ |
| Whey | _____ | _____ | _____ | _____ | _____ |
| Milk and Cream | _____ | _____ | _____ | _____ | _____ |
| Condensed/ Evaporated Milk | _____ | _____ | _____ | _____ | _____ |

Question 2 continued.

| Product | 1999 tonnes/$'000 | 2000 tonnes/$'000 | 2001 tonnes/$'000 | 2002 tonnes/$'000 | 2003 tonnes/$'000 |
|---------|---------|---------|---------|---------|---------|
| Anhydrous Milk Fat | _____ | _____ | _____ | _____ | _____ |
| Other (Please specify) | _____ | _____ | _____ | _____ | _____ |

3. In what dairy product categories have you been most successful in exporting to the Thai market over the last 5 years? (Please rank)

SMP_____                    WMP_____                    Butter_____

Cheese_____                 Yoghurt_____               Whey _____

Milk and Cream_____         Condensed/Evaporated Milk_____

Anhydrous Milk Fat (AMF)_____        Other (please specify)_____

3.1 Why have those products been successful in the Thai market?

Better Quality_____              Product Distribution_____

Strategic Promotion_____         Competitive Price_____

Produced in a Clean Environment_____      More Product Varieties_____

Other (please identify)_____

4. In your opinion, what are the significant factors influencing your decision to export dairy products to Thailand?

5. What are the problems you have encountered in the Thai market?

Legal_____                  Pricing_____

Political_____              Facilities_____

Competitors_____           Exchange Rate_____

Trade Policy_____          Distribution Channel_____

Other (please identify)_____

6. Are the Australian Dairy Cooperation promotion efforts in the Thai market helping your export drive in that market?

7. Did you benefit from any Australian government export assistance packages in exporting your dairy products to Thailand?

If yes, please specify_____

8. How do you view the opportunities for your dairy products in the Thai market in future years (2005-2007) in light of the FTA?

9. In your opinion, what countries compete with Australia in the Thai dairy market?

10. In your opinion, what are Australia's strengths and weaknesses in dairy product exports to Thailand compared to competitor countries?

|  | Strength | Weakness |
|---|---|---|
| Lower Cost of Production | _____ | _____ |
| Higher Quality of Products | _____ | _____ |
| Lower-Price | _____ | _____ |
| Advanced Technology | _____ | _____ |
| More Product Varieties | _____ | _____ |
| Product Distribution | _____ | _____ |
| Strategic Promotion | _____ | _____ |
| Cleaner Environment | _____ | _____ |
| Other (please specify) | _____ | _____ |

Victoria University of Technology

Consent Form for Participants Involved in an Interview

"Factors Influencing Australia's Dairy Product Exports to Thailand"

**Information to Participants:**

We would like to invite you to be a part of a DBA study into:

"Factors Influencing Australia's Dairy Product Exports to Thailand"

You are being asked to participate in a research study to understand the significant factors influencing Australia's dairy product exports to Thailand. The findings from this study will be used to make recommendations on the strategies to improve the performance of Australia's dairy product exports to the Thai market. The goal of this study is to examine, through case studies of selected companies, the experience of and problems encountered by Australia's dairy exporting companies in exporting to Thailand.

Your information is important and vital to help us find out what could be recommended or improved in the strategies of Australia's dairy product exports to Thailand.

If you decide to participate in a research study, you will be asked to take part in an interview with the researcher. The issues are as follows:

- The general information;
- The important factors influencing Australia's dairy product exports to Thailand;
- The experiences and the problems encountered in the Thai market;
- The significant changes in trade policy based on Australia-Thailand Free Trade Agreement (FTA);
- The opportunities for Australia's dairy products in the Thai market;
- The expectations about the dairy exports in the future;
- Each company's strengths and weaknesses in its dairy product exports to Thailand; and
- The main competitors of Australian companies in the Thai market.

CERTIFICATION BY PARTICIPANT

I,_____

Of

_____

certify that I am at least 18 years old* and that I am voluntarily giving my consent to participate in the in depth interview for the above project being conducted

at_____

by  Sukij Khorchurklang

I certify that the objectives of the study, together with any risks to me associated with

the procedures listed hereunder to be carried out in the study, have been

fully explained to me by a member of research team and that I freely

consent to participation involving the use on me of these procedures.

**Procedures:**

The interview will be conducted by Sukij Khorchurklang and the proceedings will be taped and notes taken as a means of recording data accurately.

I certify that I have had the opportunity to have any questions answered and that I understand that I can withdraw from this interview at any time and that this withdrawal will not jeopardize me in any way.

I have been informed that the information I provide will be kept confidential.

Signed:        ...........................................……………………..**Date:** ....................
Witness other than the researcher:**.................................................Date:** ....................


Any queries about your participation in this project may be directed to the researchers (DBA student name: Sukij Khorchurklang ph. 61 3 9443 7475 or Principal supervisor: Dr. P.J. Gunawardana ph. 61 3 9248 1042).  If you have any queries or complaints about the way you have been treated, you may contact the Secretary, University Human Research Ethics Committee, Victoria University of Technology, PO Box 14428 MC, Melbourne, 8001 (telephone no:  03-9688 4710).

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