

Potato Starch

A Future Opportunity for New Zealand?

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July 2012

Prepared for Auckland Tourism Events and Economic Development Ltd. This report is free for circulation as it is intended as a scoping document designed to facilitate further discussion and investigation.

POTATO STARCH

Executive Summary

This paper is a preliminary investigation into the opportunity for the growing of starching potatoes and the production of potato starch in New Zealand. Throughout the past year discussions have been occurring within the horticultural, scientific and manufacturing sectors with regards to potato starch as a potential opportunity for New Zealand. Individual companies have been exploring the possibilities of capturing starch from current waste streams; emerging businesses using new biotechnology producing sustainable products such as disposable plastic plates made from starch are seeking a domestic supply of potato starch; growers are looking to new markets and opportunities as they struggle with increasingly competitive markets; plus international companies have been making enquiries with regards to New Zealand's ability to become a supplier of potato starch. This report attempts to summaries these discussions, qualify the opportunity and detail some headline economic data to enable further investigations.

Potatoes New Zealand, (an affiliated product group of Horticulture NZ), was responsible for exports with a value of more than \$100 million last year. Their aim is to grow the New Zealand potato industry to \$1 billion by 2020 and therefore make a significant contribution to the horticulture industry strategy target of a \$10 billion industry by 2020.¹ For this to be achieved the sector will need to continue to adopt new farming systems and technology, focus upon research and development and look for new and emerging market opportunities. Potato starch appears to offer a new market for the potato industry. Asia is a high end user of potato starch and data obtained illustrates an expanding opportunity across the wider starch sector. Starch use is diversifying from food and nutrition substitutes to wide ranging industrial uses. Native starches obtain a premium price and for some applications cannot be replaced by modified starches, indicating niche market opportunities. Apart from the increasing use of starch there is a global push for environmentally sustainable products that are renewable and biodegradable; for zero waste and better production systems that take a full life-cycle approach to business.

Economic development work now needs to qualify the investment required for a starch processing facility. There are only two locations - Timaru or South Auckland for consideration taking into account the clustering of potato processing facilities and businesses. Auckland has the opportunity to play a pivotal role in facilitating such an opportunity given that food and beverage is a key economic development sector for the region and it is also home to New Zealand's sole starch manufacturing facility.

Across New Zealand horticultural products are purchased and transported around the country to be processed by businesses operating in niche market segments such as the potato chips processing or for the food services industry. Potato processing businesses in Auckland are already seeking ways to reduce

¹ NZ Grower, Vol 67, No.1 February 2012. Horticulture New Zealand.

their waste stream, motivated in part to reduce wastewater charges but also seeking to maximize their returns from their processing activities.

Introduction

A key reason for the continued supply of potato starch, given the rise of hydrolysed starches, is that it is known to be purer and of better quality than cereal starch, as it has the lowest content of fats and protein, with no colour, taste or smell.

This paper presents the findings from discussions held with technical and managerial personnel from the horticultural, processing and retail sector to ascertain if there is an opportunity for New Zealand to become involved in the export of potato starch. Research has occurred with regards to the global situation, supported by economic data and information obtained from international sources to verify what is currently occurring, providing a background for further investigation.

New Zealand Trade & Enterprise (NZTE) provided assistance with sourcing UN Comtrade Trade data and Knowledge Matrix Asia Pacific Ltd were commissioned to undertake an assessment to ascertain if initial research information collected was supported and to provide further data for this scoping report. Summaries of this information are included in this report with the full reports included as an appendix.

Caution must be noted with regards to data and information. Firstly large multinational companies operate in the starch market and do not share their information freely therefore data is only obtained from statistical collection points such as customs data. Products coded are often grouped, with many individual items making up these categories and it has been difficult to tease out these individual items.

Potato starch is imported into New Zealand with Statistics New Zealand data indicating that 2,564 tonnes of potato starch came into New Zealand in the financial year ending June 2012, at a value of \$4.16 million NZD including insurances and freight with a duty value noted at \$3.79 million NZD. Statistics NZ data also indicates that New Zealand is an exporter of potato starch mainly to Australia. Data indicates that a quantity of 2,377 tonnes of potato starch was exported to Australia in the financial year ending June 2012 however, it is unclear at this time the particular businesses involved with this.

Data obtained is at times contradictory with UN Comtrade data noting that in 2010 New Zealand exported approximately \$US 1.2 million worth of potato starch, and by volume 1773 tons. Searches conducted of Statistics New Zealand export data on their Infoshare site, found that in 2010 some 2,552 tonnes were exported which is different to the figure noted by the Comtrade data. The NZTE report notes that “while New Zealand accounted for less than 1% of the total world exports of potato starch in 2010, over the period 2006-2010 we had a CAGR of 223% by value and 207% by volume”, further noting that “99% of our exports of potato starch go to Australia, with a miniscule amount going to Fiji.”² Customs data is used to make up these statistics and after further investigation it was found that the UN Comtrade Code, 110813 (Potato Starch) also includes the following items;

² Un Comtrade; <http://comtrade.un.org/db/mr/rfCommoditiesList.aspx?px=H2&cc=110813>

- Edible potato meal
- Potato flakes
- Granular potato powder
- Potato starch (including high quality potato starch)

Whilst there are clearly data gathering difficulties, there is enough supporting information that illustrates the opportunity in broad terms as the markets noted are accurate and there is clearly a trade occurring. This report details key countries and companies dominating the starch industry and key markets for starch, with information in regards to price and growth prospects.

Several companies have been identified that are importing potato starch. For example, National Starch & Chemical Ltd located in Auckland has no manufacturing sites here in New Zealand but are a supplier of potato starch to New Zealand businesses. National Starch & Chemical Ltd, now operating under the brand name of Ingredion™, is a multi-national manufacturer of industrial starches, adhesives, polymers, electronic and engineering materials and specialty food products. Chemiplas™ also note on their website that they work with Avebe™ to supply potato starch, noting that Avebe “supplies a significant amount of starch to the paper industry in the areas of surface sizing, wet applications, coatings and converting operations.”³

Investigations have highlighted some innovative companies retailing products made entirely from potato starch. This may be a growing business opportunity with the plastics industry in New Zealand starting to witness a shift in products from traditional forms of plastic to those that are more sustainable, using plant based rather than oil based compounds. Kiwi Green Pak for example is promoting, “NatureWorks Ingo™ biopolymers derived from an abundant 100% annually renewable plant resource, noting that compared to PET, Ingeo reduces fossil fuel usage by 47%”.⁴

This report provides an initial assessment of the concept and industry attractiveness. The report notes in particular, issues relating to global trends, supply and demand factors, the diversity of suppliers and customers and includes general price assumptions and growth forecasts, from information that is publically available.

Background

Through work being conducted within the food and beverage sector lead by Auckland Tourism Events and Economic Development Ltd (ATEED), an opportunity was presented in July 2011 for support by Export Incite. A Taiwanese food manufacturing company was exploring the possibility of New Zealand being able to supply potato starch including a joint venture partnership if necessary to facilitate the development of such an opportunity. Export Incite were introduced to this company by the former Taiwanese Ambassador. This Taiwanese food manufacturing company works across a range of food and

³ Chemiplas New Zealand. Creating Solutions, Pulp & Paper. Website accessed 20/07/2012. <http://www.chemiplas.co.nz/pulp-and-paper.html>

⁴ Food NZ. Journal of The New Zealand Institute of Food Science and Technology INC. August 2012. Page 11.

beverage items from FMCG items such as bottled juices and waters to instant noodles and flavour sachets. The company wants to source 50,000 tonnes of potato starch required for their noodle production. They own approximately 100 noodle fast food outlets throughout Taiwan and China and their expansion plans are to reach 700 outlets over the next 5 years. They currently import large volumes of potato starch from the European Union (EU) but due to the high tariffs and duties, as well as supply shortages resulting from the potato blight over the last 2 years, are looking for alternative supplies. Their annual demand for potato starch is 50,000MT which requires approximately 250,000MT of root potatoes. In the initial stages they are looking to source at least 5,000 to 10,000MT of potato starch per annum from New Zealand (if the quality and the price are right). They would prefer simply to import potato starch, but they are willing to invest in a joint venture to build an extraction plant to secure and ensure a constant supply.

ATEED staff have continued to research this opportunity, holding meetings with key stakeholders and the industry to gather information used as the basis of this report. A priority early on was to send a comparable sample of starch to Taiwan from New Zealand to keep the opportunity open for New Zealand and to keep discussions occurring. Work between ATEED and Massey University has ensured that a supply of starch has now been delivered to Taiwan from starch sourced from Bluebird Foods current waste by-product.

New Zealand has previously received international enquiries related to potato starch. In 1892 an article in the Timaru Herald reported the failure of a potato starch initiative noting that due to all the manufacturing processes involved to get the potato starch, added with the costs of packaging and shipping charges there were no likely profits. At the time it was thought that potato starch would be a substitute for corn flour but it was found to be too watery and could not be made at a price that would compete with it. They believed that the only use for it was for one particular class of goods and there was little demand in England at the time.

Investigations have also uncovered that Timaru has had another more recent approach from an international company exploring the possibility of establishing a potato processing plant with overseas investment to assist with the growing and manufacture of potato starch. The work South Canterbury Chamber of Commerce carried out was with an Investment Manager from Investment NZ. The company expressing an interest was from China and had apparently spent years researching the best growing locations for starch production. They were motivated by their own inefficient farming systems in China and their belief that they could introduce a scalable highly mechanised and efficient growing system in NZ. The company was proposing a two stage process: In phase one, they would secure the raw material (approximately 300,000 tons of potatoes) and in phase two, commission the plant which they required to be in production by the end of 2013. South Canterbury Chamber of Commerce has not heard if they wish to continue with the project.

Whilst this project has not been established, what has occurred is that contact has been established between the South Auckland Office of ATEED and South Canterbury Chamber of Commerce & Aoraki Development Business and Tourism. It is clear that there are synergies between these two economic development agencies, both operating in key horticultural areas of New Zealand. South Canterbury of course would be keen to develop a South Island processing plant. Wendy Smith, Chief Executive of

South Canterbury Chamber of Commerce notes that “South Canterbury has exceptional soil and the appropriate climate for potato production and is a major supplier to McCain’s and of course has their very own home-grown Heartland Potato Chips which the South Canterbury office helped to develop and support. The Timaru District is the centre for current potato processing and manufacturing with a plentiful supply of potable water, reasonably priced industrial land and facilities, excellent transport options including its own port and now an energy centre that can provide on tap steam for processing without requiring the upfront capital investment.”⁵

Apart from international enquiries, bio-technology businesses developing in New Zealand are currently importing potato starch and are calling for the development of a domestic supply. One such company is Potato Pak a company based in Blenheim that is producing disposable plates made from potato starch. This company has won awards for its environmentally sustainable products and yet sources the key ingredient from overseas.⁶

Barry Cowen, Sector Manager for Food & Beverage at NZTE spoke with Richard Williams from PotatoPak and noted that Potato Pak is currently having to buy its processed potato starch from Europe but has been undertaking the capability studies for what is available from New Zealand and is very interested in investing in a processing plant which he envisages would be based in Auckland. He has already been in discussions with all the main potato waste companies such as Talleys, Griffins, Bluebird and he has worked out that there is approximately 6000 tonnes worth of potato starch that could be extracted from New Zealand’s waste per year. Richard believes he would be able to use all of this for his own manufacturing. When asked of his thoughts on the sustainability of the potato starch pricing, Richard noted that “the uses of potato starch are growing and that he thinks prices will remain quite high. Richard has done some approximate costing of equipment needed to process starch from waste and there are a number of equipment options namely from the USA/China and India. Potato Pak is looking seriously at the Indian equipment which costs approximately \$500,000. In terms of being able to use the same plant for processing of starch from grown potatoes, this would just be a matter of buying a machine to grind up the potatoes to release the starch”.⁷

It has been clear from early on that economic data and further analysis of any such opportunity is required. Kmatrix notes work needs to qualify the market for potato starch by use noting trends in each of the key segments. It is important to understand which countries are likely to increase their imports of potato starch as a result of wider changes in their economy. KMatrix notes that “wider literature discusses the total but deals less with the economics of production. This is likely to change as a result of the changes in the quota and subsidy regime in the EU”. Deeper analysis and modeling needs to occur assessing key markets segments.

⁵ Wendy Smith, CEO, South Canterbury Chamber of Commerce. Email to Wendy Voegelin, ATEED. 30 April 2012.

⁶ Richard Williams, Potatopak. Biotechnology Learning Hub. The University of Waikato. 10 December 2008.
http://www.biotechlearn.org.nz/focus_stories/potato_plates/video_clips/why_import_potato_starch_v0369

⁷ Barry Cowen, Sector Manager, Food & Beverage, New Zealand Trade and Enterprise. Email to Lynda Fleming/Wendy Voegelin based upon a telephone conversation with Richard William, Director, Potato Pak. 22 September 2011.

New Zealand does not currently grow starching potatoes and from initial investigations this looks as though it would take approximately five years to have the first early crops ready for harvesting, allowing time for finding the appropriate seed potatoes and planting. Trials are presently underway with an international seed supplier and local growers to fast track this process. There is however potato processing already occurring and starch not being recovered currently as a waste by-product. This is clearly an early opportunity area where waste stream starch could act as the initial supply source. Individual companies such as Griffins and Bluebird have started these investigations and more support may need to be given to these businesses to develop such an initiative.¹⁵

New Zealand Food Innovation

The Government established an Open Access Food Innovation Network across New Zealand with the purpose of encouraging the food and beverage industry to develop new food and beverage ingredients and consumer products. There are four hubs across New Zealand each having a different focus:

- Auckland (Manukau) – Process foods
- Waikato – Dairy products & ingredients as well as meat based products
- Canterbury – Plant based ingredients and consumer food
- Palmerston North – Food research

A fundamental fact is that the world's global population is increasing and therefore food products will require continued adaption to meet demand needs. It is estimated that we will be looking to feed nine billion people by 2020, with forecasters predicting world demand to double in the next 40 years. New Zealand producers need to be alert to market demands and changes in global trading conditions if they are to make the most of the opportunities offered by these trends.

However, there are difficulties for potato growers with horticultural areas facing competition for land from arable and dairy sectors coupled with biosecurity threats with pest and diseases such as Psyllid, costing millions and threatening the entire industry. Prices are volatile with fresh vegetable markets static and food supply chains becoming dominated by large enterprises. Recent discussions held at the Potatoes NZ annual conference noted that in New Zealand potato growers are having lower per hectare yields compared to past times. This is a potato industry priority to find why this is and possible solutions to the problem. Developments such as Biofuels may also emerge as another threat to food production as businesses seek to produce for higher paying market segments. Traditional markets such as Europe and the USA have experienced recessions and markets are changing with many New Zealand businesses focusing their attention now on Asian market opportunities. Different tastes and eating habits are occurring amongst the population with the proliferation of French Fries being a good example of this.

It is estimated that over 40% of the total starch produced in the European Union is used for non-food purposes. Non- food uses include paper and plastic packaging manufacture, such as bio-plastics, pharmaceuticals and cosmetics manufacturing, textiles manufacturing and adhesives manufacturing. An analysis of food products containing potato starch as an ingredient shows that its uses span many

processed food product categories. According to the Global New Products Database (GNPD), during the last 12 months there were 3102 food products launched worldwide that contained potato starch as an ingredient. The United Kingdom led globally with 17% share of the products being launched, followed by the United States (11%), then France with 10%.⁸

New Zealand Trade & Enterprise note “that food and beverage exports have trebled in the last 17 years, from NZ\$6.96 billion in 1990 to \$21.43 billion in 2008. Food and beverage exports contribute over 10 percent to expenditure on GDP and represent half of all New Zealand's merchandise exports by value.”⁹ According to Statistics New Zealand, the preparation of cereals, flour and starch was placed 13th in New Zealand's top export commodities, worth \$848 million NZD in February 2012.¹⁰

Cereals, starch and flour related products are a significant export merchandise earner for New Zealand that has potential to be expanded. Work must occur across the innovation network to leverage knowledge from food, plant and other scientific research to processing applications. For Auckland with a focus upon ‘Process Foods’ the processing of starch particularly as a food ingredient seems a logical fit.

Potato Economy

The potato is one of the most valuable food commodities in international trade with the Food and Agricultural Organisation of the United Nations (fao.org) ranking it as the world's fourth most important crop, after maize, wheat and rice. It also notes that potato production in developed countries, especially in Europe, has steadily declined by one percent per annum over the past 20 years, whereas output in developing countries, especially Asia, has expanded at an average rate of five per cent per year. Countries such as China and India are fuelling the growth with their large export of potatoes, making the international potato trade highly competitive. In China potatoes are considered a high-valued crop, with demand growing exponentially compared to other bulk commodities such as wheat and rice. According to the FAO, China is the largest potato producer in the world, with output of 72 million tonnes in 2007. This accounts for 23.3% of the world's potato production. The top 10 potato producing nations grow more than 70% of the global crop, as listed below:

1. China ... 72 million metric tons (23.3% of global potato production)
2. Russia ... 37 million metric tons (11.5%)
3. India ... 25 million metric tons (7.8%)
4. United States ... 20.5 million metric tons (6.4%)
5. Ukraine ... 19.5 million metric tons (6.1%)

⁸ Kara Fawcett, Strategic Research Analyst, New Zealand Trade and Enterprise. 29 September 2011.

⁹ NZTE website. Food & Beverage. Date accessed 20/07/2012. <http://www.nzte.govt.nz/access-international-networks/explore-opportunities-in-growth-industries/growth-industries/pages/food-and-beverage.aspx>

¹⁰ Business New Zealand. New Zealand Economy, facts and figures. New Zealand Trade & Enterprise. Website accessed 20/07/2012. <http://business.newzealand.com/northamerica/en/invest-in-new-zealand/new-zealand-economy-facts-and-figures/>

6. Poland ... 15 million metric tons (4.7%)
7. Germany ... 13 million metric tons (4.0%)
8. Belarus ... 8.5 million metric tons (2.6%)
9. Netherlands ... 7.5 million metric tons (2.3%)
10. France ... 7.5 million metric tons (2.3%)

**Based on key statistics from the Food and Agricultural Organization of the United Nations (fao.org)*

Interestingly, according to the official website for the International Year of the Potato (IYP), only one in four potatoes grown in the world actually gets eaten by people. Almost half end up being fed to livestock. The remaining one quarter are used as raw material in the production of alcohol and starch.

New Zealand potato exports reached a record high in 2011 as more than \$100 million worth of produce exported. Over 93,000 metric tonnes of potatoes, including 30,000 tonnes of fresh potatoes and 62,000 tonnes in frozen products, were exported in the year to 30 June 2011. ¹¹

Reports note that more than 90 % (in value terms) of the imports from New Zealand into Australia are from frozen prepared potatoes. Since 2000, New Zealand production has displaced product from both Canada and the United States and now accounts for approximately 60% of processed potato imports for Australia. New Zealand still however, only makes up a small portion of the total Australian market. Australian grown potatoes make up 67% of canned potatoes. Only 9% of Australian frozen vegetables were made from imported product. With approximately 600,000 tonnes of potatoes produced in Australia for the processing sector, and imports accounting for around 7% of domestic production. ¹²

Ron Gall, Business Manager for Potatoes New Zealand has estimated the following key industry statistics based upon his experience and contacts within the New Zealand industry at a recent conference. There are approximately 236 potato growers and 32 seed growers in New Zealand, with a farm gate value of \$147 million, covering some 11,717 hectares of area planted in potatoes. Total production was approximately 586,000 tonnes divided into the following categories;

- Seed 34,000 tonnes - 11% (from 1358 ha) North Island = 162ha / South Island = 1196ha
- Table 138,000 tonnes - 30% (from 458 ha) North Island = 2504ha / South Island = 954ha
- Process 414,000 tonnes - 59% (from 1358 ha) North Island = 2362ha / South Island = 4369ha

Retail and export value noted as:

Domestic;

- Frozen \$50m
- Potato \$160m
- Frozen potato products wholesale (into HRI, QSRs & takeaways) \$142m

Export;

- Fresh \$20m
- Process \$80m

¹¹ News: New Zealand potato exports break through NZ\$100m.

<http://www.potatopro.com/Lists/news/DispForm.aspx?ID=6334>. Accessed 24/07/2012

¹² Australian Vegetable Imports. April 19, 2006. <http://www.potatogrower.com/news/print.cfm?id=838>

Interestingly, New Zealand was ranked the 8th largest processed potato exporter in the world by Rabobank in 2009.¹³

Native Starches

Potato starch is known as a native starch where the starch is extracted from raw material or in its original form. Fresh potatoes are cleaned before starch extraction. Adhering impurities are removed by intensive washing with water. Native starches can either be in a dried or a liquid form. Other starches are either modified by a chemical, physical or enzymatic process, or hydrolysed (sweeteners) where the starch chain is broken into smaller glucose chains via hydrolysis. A large business cost involved in the processing of starch is energy consumption used for drying the potato starch.

Starch extraction from potatoes since the early 1980s has become increasingly prevalent. According to the International Starch Institute the food industry use potato starch as a thickener for sauces and stews, a binding agent in cake mixes, dough, biscuits and ice-cream. It is widely used by pharmaceutical, textile, wood and paper industries as an adhesive, binder, texter agent and filler, and by the oil drilling firms to wash boreholes.

Potato starch is preferred in its native form because it has a longer starch chain, very regular starch granules and high purity. It is important to note that potato starch processing is entirely different to other types of starch processing such as maize. Therefore potato starch is usually produced in different processing plants.

Historically Europe has been a key producer of potato starch primarily because potatoes have a significantly higher starch yield per hectare compared to cereal, but also because potatoes have high water content and it is not profitable to transport them any great distance. Equally important is that they cannot be stored for a long period of time as the potato starch content decreases during storage. At the processing stage the typical mills in Europe run only for a few months a year because potatoes cannot be stored. Starch potato plants produce a large quantity of residual water that manufacturers have to dispose of.¹⁴ The industry in Europe is dominated by several large multinational companies.

Global Trends

¹³ Ron Gall, Business Manager, Potatoes New Zealand. Powerpoint presentation. Horticultural Conference, Ellerslie Convention Centre, 25th July 2012.

¹⁴ Evaluation of Common Agricultural Policy measures applied to the Starch Sector. Final report. Agrosynergie. November 2010.

According to a report by Agrosynergie, starch production has grown worldwide for many years. It notes that the starch processing industry has undergone significant changes, diversifying its products from a basic product (native starch) with limited uses to a large range of valuable ingredients for the food and non-food sectors. Strong growth from all starch types occurred from 2001 to 2008, with native starches having a 14% growth as compared to modified and hydrolysed starches each achieving a 24% growth rate during this time. Growth was strongly driven by the USA however this is mainly from hydrolysed starch rather than from native starches. Potato starch as a raw material in 2005 made up 6% of the world market.¹⁴

Kmatrix note from recent research that “the global native starch market is valued at £28bn, with potato making up around 4%, or around £1.12bn, behind corn that provides around 75% of starch output. Potato growing costs account for more than 65% of potato starch production costs of native starch.”¹⁵ Further detailing the total native starch market as follows:

June 2011 the global trading position for native starch production was:

Source	Production m tons
Corn	13
Tapioca	8
Potato	1.5
Wheat	1

Source: Tapioca Conference, 2011.

The majority of starch production is occurring in the EU and China with smaller volumes produced in Japan, the US and Canada.¹⁴ Whilst potato starch is produced around the world, the European Union (EU) has been the dominant supplier. From the EU more than half the starch comes from maize, a third from wheat and the balance from potato. Whilst wheat production has been growing, maize and potato production is reducing. Starch export and import flows are relatively low compared to production, indicating that starch is localised because most of the starch products are bulk commodities with a relatively high transport cost. Manufacturers therefore seek to be close to the end-users and growers.¹⁴

There are four main world exporters of starch, the USA, Thailand, European Union and China. Of this the EU exports mainly native starches, of which 80% was potato native starch. Between 2006 and 2008 these native starch exports experienced a strong decrease.¹⁴ The EU produced 1.6 million tons of potato starch in 2008, and exported 626,000 tons. Germany exports around 40% of their production.¹⁵

Thailand is another major exporter of native starch although this is mainly from cassava. All categories of starch products exported from China have increased rapidly since 2002. Japan is a major importer of native starch and growth has been steady for a number of years, with approximately 70% from cassava and 20% from potato. However, potato starch declined in 2007 and 2008, being replaced by tapioca

¹⁵ Knowledge Matrix Asia Pacific Ltd (Kmatrix). Mark Copsey. 29th June 2012. Potato Starch Opportunity Review.

starch. Native starch imports of tapioca and potato are more significant than modified ones in some Asian countries, due to them being valued in Asian food. China has experienced sudden growth in native starch imports which peaked in 2006.¹⁵

Total global production of native potato starch may not have changed much between 2000-2010 but as Kmatrix notes “the nature of the total market for starch is and that is creating opportunities”.

The largest source of starch is corn with a significant amount coming from the US. The US is also the largest user of starch and the potential for the US to export its starch is restricted given that it is GM sourced. Therefore “the proportion of potato starch that is exported in relation to its production is high, so in the case of potato starch it is 7% of the total production but 19% of global native starch exports”.¹⁵

In terms of end user consumption of starch from the EU, it is divided into 60% for the food sectors and 40% for non-food sectors. The paper industry which is one of the major starch users, went through a slowdown in consumption in 2008 due to the global financial crisis.¹⁶

In May 2012, the Emsland Group, a key supplier of potato starch based in Germany, reported that during coming years raw material supply in general, is expected to become more volatile. Noting that “according to research from the International Center for Tropical Agriculture (CIAT), severe outbreaks of new, invasive pests triggered by rising temperatures could threaten Southeast Asia's multi-billion dollar cassava industry; as well as the livelihoods of the hundreds of thousands of small farmers that rely on the crop for income. In Europe prices for potato starch will increase with about 100 €/t due to rising costs of raw materials related to subsidy cuts. Volumes of starch potatoes in 2012 might be 20% lower, while in the long term cultivated potato areas face annual reductions of about 4%. These developments also lift prices for potato flakes and granules.”¹⁷

EU Starch Production

Germany and the Netherlands are the largest producer of potato starch followed by France and Denmark. In 2010 Germany accounted for 56.3% of the world's exports of potato starch by value (approximately \$US 220 million) the cumulative average growth rate (CAGR) over the period 2006-2010 was 3.8%. Germany was the biggest exporter of potato starch by volume accounting for 53.4% of the world's exports of potato starch in 2010 (approximately 405877 tons). The CAGR over the period 2006-2010 was -0.6%. Other significant exporters of potato starch by both value and volume are the Netherlands, Poland, Belgium and Canada. Belgium shows an especially strong CAGR over the period 2006-2010 of 71.7% and 99% value and volume respectively. The Netherlands and Poland also show strong CAGRs, especially when compared with Germany.¹⁹

¹⁶ Evaluation of Common Agricultural Policy measures applied to the Starch Sector. Final report. Agrosynergie. November 2010.

¹⁷ http://www.emsland-group.de/files/hjm12_172_news_release_forecast_potato_based_products1.pdf

Monitoring data indicates that potato starch production is sensitive to climatic conditions, disease and pest pressure that cause significant fluctuations in year on year production. In 2003 a drought affected all member countries and again in 2006 dry climatic conditions and frost also explained a drop in potato production. The result of a drop of potato production leads to a drop in potato starch the following year, with 2004 and 2007 experiencing falls in starch production.

It is noted that the EU consumes 1402 thousand tonnes of potato starch on average and overall consumption is lower than domestic production and it generally follows the same trend. In 2004 both production and consumption witnessed a major decline and consumption almost caught up with production. The sharp drop of production in 2004 caused more than half of stocks to be consumed until they were built up again in 2007. In 2008 there was a sharp decrease in consumption especially in the paper industry caused by the financial crisis with reports noting the existence of stocks over the period seems to show an over-production of starch potato.

The EU imports of potato starch from other countries shows a rising tendency; however these are explained by the high import level of the United Kingdom. Half of the United Kingdom's imports came from the member countries with Germany and the Netherlands the second biggest importers. Germany is the biggest exporter with 40 to 50% of production going to countries outside the EU.

In terms of consumption, the industrial sector is the biggest consumer of potato starch in Europe, with the UK, Netherlands, Denmark having almost 100% of national production going to the industrial sector. France and Germany use a small amount for human consumption besides the industrial sector, with Sweden allocating significant amounts of potato starch production to the processing sector.

Potato starch production is subject to production quotas defined in the EC regulation for all member states. Production tends to be lower than the quotas and only Denmark produced up to its quotas.¹⁸

Trade Relations

Government policy in China is increasingly focused on protecting and developing China's domestic potato starch industry. In September 2011 China ruled that they will impose duties ranging from 7.5% to 12.4% on imports of potato starch from the EU for the next 5 years. This is on top of already existing anti-dumping duties that range from 12.6% to 56.7% for EU potato starch.

In 2010 China accounted for 11.5% of the world's imports of potato starch by value (approximately \$US64.6 million), making China the biggest importer of potato starch, by value. The cumulative average growth rate (CAGR) over the period 2006 – 2010 was 25.6%. China was also the biggest importer of potato starch by volume in 2010, accounting for 13.8% of the world's imports of potato starch in 2010 (approximately 142483 tons). The CAGR over the period 2006-2010 was 20.2%. Other importers of potato starch by both value and volume are: the US, Netherlands, United Kingdom and South Korea. The

¹⁸ Evaluation of Common Agricultural Policy measures applied to the Starch Sector. Final report. Agrosynergie. November 2010.

US and United Kingdom show modest or even declining growth however the Netherlands and South Korea show strong growth (though not as strong as China).¹⁹

China has been actively challenging the EU potato starch industry, noting that competition from EU exporters selling potato starch at below-cost, or a dumped price in the Chinese market was thought to be seriously damaging development of the domestic market. Potato starch imported from the EU was priced at \$430 a ton in China in 2010, accounting for 30% of the exporter's total cost with the domestic market in China set at \$1,800 a ton. China blamed EU subsidies as enabling them to produce a margin despite the price being far below the local market price with EU supplied potato starch holding 40% of the market share in China. It is expected that China will double its demand for potato starch from 2011 to 2015, to reach 1.2 million tons annually.¹⁵

Potato Starch Supply Chain

Firstly a critical stage in the potato supply chain is potato seed production, which needs to be planned several years in advance. In the EU seed production is either planned by the manufacturers that buy seeds from breeders and sell them back to potato growers, or are directly managed by farmers. Growers either buy certified seeds every year, seed their own starch potatoes or buy seeds then multiply them.

Starch potato varieties are specific for starch production. Supply is usually organized on a contract basis. For example in the EU growers seed starch potatoes only if they have a contract with a manufacturer and this is reinforced by the EC aid scheme requirements. Only in Germany, the Netherlands and Poland are some varieties also used for other types of processing.

Growers in the EU tend to work as cooperatives or are organised into companies owning potato starch mills. Only in France, Finland and Poland are private companies supplied by individual growers who are not owners of the mill. Growers in these cases are represented by committees or groups that have a role in coordinating deliveries between growers and manufacturers and negotiating contracts and prices. Research has not been conducted into grower arrangements in Asian countries but contract growing is also likely.

Seed growers in New Zealand are already in the process of researching varieties and possible sources of seed stock for growing starching potatoes. Plant and Food Research is undertaking research of varieties of potato crops with Massey University keen to start trials to assess starch content on these potato varieties as soon as possible.

For starch production, simple late-ripening potato varieties are preferred. Their starch content of 17 to 20 percent is higher than that of food potatoes (around 10%). The tubers are first washed, then rasped and processed to produce a slurry, from which the potato starch is separated and dried in a succession of steps. The result is a high purity native starch with a moisture content of around 20 percent. A Danish

¹⁹ Kara Fawcett, Strategic Research Analyst, New Zealand Trade and Enterprise. 29 September 2011.

potato starch company indicated that the required input to produce 100kg of potato starch was 430kg potatoes, with a starch content of 18.77%, 325 litres of water for cleaning the potatoes and producing starch and 44kWh of energy.²⁰

In terms of global starch manufacturing, this is a highly concentrated industry with few companies dominating. However, with regards to demand, there are numerous end users belonging to various industries and frequently located far from the potato starch mills. Given the high transport and storage costs of potatoes, it is more profitable for mills to be located closer to potato starch growing areas than to end users; this is particularly the case in Europe.

What is clear in Europe is that the supply chain is highly integrated with growers being the owners of the starch mills (either directly or via their cooperatives), and in some cases they have invested in the end user sectors. This type of model should be considered for New Zealand with cross industry sectors pulling investment and expertise together.

In Europe, trans-border cooperation is occurring with a proportion of the starch potatoes grown in Germany being processed in Dutch facilities and conversely part of the Dutch production being processed in Germany to reduce transport costs. Operators have also set up associations and unions to represent the interests of different stakeholders. The AAF (Association des Amidonniérs et Féculiérs) represents the interests of the European Starch industry. The CESPU (Committee of the European Starch Potato Producers' Unions) is a European Association of potato starch growers.¹⁴

New Zealand's geographical position does not allow for this type of cooperation, however the Australian starch market dynamics do require an assessment as there may be some opportunities to work in a Trans-Tasman partnership or at least assess the growth rates that Australia has experienced as a comparison.

Potato Starch Prices

A common practice in Europe is to rotate starch potatoes with cereal crops. The purpose of this is to prevent pest proliferation and disease pressure and between cereal crops and starch potatoes a nitrogen crop can be grown. This is a similar practice to what is already occurring in New Zealand with current potato growers. Growers tend to plant a range of crops to ensure that returns are spread across activities thereby protecting themselves from crop failures and volatile prices. In Europe, farmers are not specialized in starch potatoes given the rotation that occurs and many also produce cereals and sugar beets. In Europe starch potatoes and potatoes for human consumption are separate markets, and starch potatoes used for processing are not sold for human consumption. In some countries such as the Netherlands, Germany and Poland, growers often grow varieties suitable for both types of outlets. The price of potatoes for human consumption is higher than the minimum price for starch potatoes. In

²⁰ Karen Hamann. Email to David Anstice, Auckland Tourism, Events and Economic Development Ltd, 4 October 2011.

Europe, however, the price of potatoes grown on contract may be relatively close to the price of starch potatoes. The price for potatoes for human consumption fluctuates depending on production and demand, whereas prices for processing should vary less based upon contracts signed with manufacturers.

The starch potato price fluctuates less in Europe given that it is regulated by the minimum price set by EC regulation, however manufacturers pay price top-ups at times. Specific support has been provided for potato growers within Europe via a minimum price which was combined in 1992 with direct coupled aid (per tonne). The previous direct aid schemes were replaced with a simple payment. This single payment is decoupled which means that payment is not conditional on production of any specific product. The direct couple aid was partially decoupled (40%) in 2006 and should be fully decoupled in 2012. EU regulations established that in 2012 the starch potato support will be fully decoupled and introduced into the Single Payment System. Therefore the starch premium, the producer minimum price, direct payment and quota will be abolished in 2012. Production refunds and export refunds granted to industries processing starch and selling their products on the Community Market were abolished in July 2009, but export refunds allocated to starch end user industries exporting products outside the Community have not been abolished but are no longer applied.²¹ It is important to note that the EU is currently developing a new agricultural policy and this is likely to still provide some form of protection but details of this require further investigation.

A Danish potato starch company KMC notes on its website that “with the forthcoming cessation of EU subsidies in July 2012, the company is facing a huge challenge in creating a new business foundation that, as a minimum, will create additional earnings in the order of the lost subsidies”. Commenting further, that while Danish starch potato farmers had both a right and an obligation to deliver, ‘we face the risk of receiving significantly fewer potatoes for processing in our factories with resulting free production capacity. This could create a vicious circle with decreased earnings and even lower payments to farmers’.²²

Based upon the export value of potato starch exports (global average, \$US per tonne) over the past ten years there is a general upward trend in potato starch values and prices. There has been a particularly large spike in the first two quarters of 2011.

Markets for potato starch include the following countries: US, China, Russia, South Korea, Philippines, Malaysia, Indonesia, Taiwan, Mexico, Brazil, India and Japan. China’s demand for starch is increasing at a rate of 10% pa. As a result therefore, prices have trended upwards. Potato Starch has increased from around US \$375 in 2000 to US\$600 in 2010 and prices over a US\$1,000 in 2011. As previously mentioned these prices can reflect the vulnerability of crops and factors such as crop diseases and pests. The EU increased its exports from 400,000 tons in 2000 to 600,000 in 2010.²²

²¹ Evaluation of Common Agricultural Policy measures applied to the Starch Sector. Final report. Agrosynergie. November 2010.

²² KMC <http://www.potatobusiness.com/index.php/joomla-overview/37-business/257-jensens-challenge-at-kmc>

Research and Development

Adhesives derived from potato starch are valued in medicine because they do not include any health concerns. Medical research is also being conducted on the properties of 'resistant starch' or starch found in starchy foods that is not digested or absorbed in the small intestine. Resistant starch is believed to have similar physiological and the health benefits of fibre.¹¹

Potato starches can also be processed into films, carrier bags, disposable cutlery and packaging materials. These biomaterials can replace petroleum oil-based products and they are capable of being sprayed, formed or expanded into various shapes and containers. Depending on how they are formulated, materials based on plant starches are biologically degradable.

At present, the worldwide capacity for producing bioplastics is less than 100,000 tonnes a year, however Bayer notes that "the European Bioplastics Association forecasts a rapid increase in capacity, with worldwide production exceeding 1.5 million tonnes by 2011, not least because of high oil prices and the question of climate change. In countries such as France, Italy and Australia, there is a political will to introduce biologically-degradable carrier bags. This will of course mean greater demand for potato starch."

Bayer also notes that "potato starches are used to produce bio-surfactants that can replace synthetic detergents in washing powders, soaps and shampoos. Moreover, potato starch is fermented and distilled into bioethanol, which is being mixed with conventional petrol in a number of industrial countries. In the future, biotechnology may improve the efficiency with which renewable raw materials are obtained from potatoes, because gene technology can be used to alter a variety's starch profile."²³

Canadian scientists are developing effective, high performance and environmentally-friendly packaging materials from thermoplastic starch blends. The research aims to develop potato polysaccharide based bio-plastic film and foam to improve the performance of potato-based bio-plastic.

Plastics New Zealand in 2009 released a report titled 'Managing the transition. Degradable Plastics in New Zealand'. In this, it notes that brand owners, retailers and consumers are interested in plastics made from renewable resources and those that break down in the environment. The interest is high because amongst other reasons, consumers want products with reduced environmental impacts and both retailers and manufacturers perceive this to be a marketing advantage as bio-plastics utilize renewable resources.²⁴

Avebe and BASF have initiated a joint R&D optimized amylopectin starch potato using GM technology, looking at GM potatoes designed to have a consistent type of starch that they believe will enhance its value. One of these Amflora is projected to result in added value of £2,000 per hectare.

²³ Courier Bayer Crop Science Magazine.

http://www.agrocourier.com/bcsweb/cscms_de.nsf/id/Potato_Starch_Agro?Open&ccm=200130000&L=Agro&markcolor=%23003399

²⁴ Managing the Transition. Degradable Plastics in New Zealand. A guide and Industry Commitment. July 2009. Plastics New Zealand.

There is also an opportunity in New Zealand to take waste by-product from existing potato processors and use this waste starch for a commercial gain. Companies such as Bluebird and Griffins have been considering this for some time and have started more seriously assessing the opportunities around this. This requires a more in-depth analysis and investigation with the key stakeholders involved as they have been working with biotechnology companies gathering data and information.

Economic Development

New Zealand's starch exports are currently dominated by maize. NZ Starch is the sole producer of starch and glucose in New Zealand, made from maize that is non-GMO and gluten-free. The company is a supplier of maltodextrins and other maize related products with an annual turnover in 2009 of \$40,586,070NZD. Exports go to Australia, Indonesia, Japan, Malaysia, Mexico, Spain, United States, and Zambia. NZ Starch has been approached regarding the opportunities around potato starch and has expressed a desire to participate in any developments, discussions and potential opportunities.

NZ Starch was previously owned by Penfords based in the USA, however was sold off as part of Penford's business restructuring to focus more on modified starches. NZ Starch have been approached before with regards to the processing of potato starch but have felt that there is not a large enough opportunity for this to proceed, with little potato starch purchased in New Zealand balanced against the investment required to establish such as processing facility.

For potato starch developments to occur in New Zealand, the key issue is the processing of the potato starch. Potato starch extraction is quite different to maize starch processing and therefore usually occurs in separate manufacturing facilities. Crop seasons are another factor for consideration.

Potatoes for a starch manufacturing facility would be sourced from across New Zealand. Timaru has some advantages given that it currently processes the largest volume of potatoes in New Zealand and has less expensive land, water and electricity. However, Auckland also has processing plants and businesses such as NZ Starch already in existence involved in exporting not only starch but other processed food products. The Food Bowl is also focusing on food & beverage processing innovation and is located close to the airport.

It would seem logical to support an existing starch company to diversify if they saw a business opportunity. Alternatively a processing facility in South Auckland close to current potato processors is another option focusing upon import substitution in the first instance with the idea being to start from small beginnings to then grow and develop capacity before exporting. It would also seem logical that if waste by-product was to be used as a starting point, then location within a close proximity to plants already processing potatoes seems appropriate.

Auckland has a natural clustering of food related industries, from horticultural growers and exporters through to manufacturing and high value niche food processors. Equally Timaru has a clustering of businesses and significant hectares of land already dedicated to potato growing. It is important to note

that these geographic differences are an advantage with different crops grown in each region and different growing seasons dependent on the climate of each region. It is important for any initiative to involve work between the two regions as many synergies currently exist. Massey University is keen to undertake trials on potato varieties that Plant & Food have been working on and this requires an initial investment from partners for this work to occur. Funding for research and coordination of the initiative is the next major activity.

Auckland Tourism Events and Economic Development (ATEED) have indicated that they are prepared to consider putting some funding towards further research however they would like to see funding matched by the industry. Potatoes New Zealand has some funding available for Research & Development however all applications must go through a process of review with a number of proposals likely to be put up for consideration. Plant & Food may also be able to support research funding and initial talks in this vein have commenced.

It is clear from feedback to date that Potatoes New Zealand is not in a position at this time to take a lead role in developing an initiative related to potato starch, with the industry faced with the much bigger issue of dealing with Pysllid that has absorbed significant financial resources and effort in recent years. However, Potatoes New Zealand have realised that to grow potato businesses in New Zealand that it is vital work occurs across sectors to grow this industry. To this end a new industry group has been formed with representatives from growers, processors, wholesale, food services and retailers starting to work together on achieving cross sector integration.

From discussions held to date, it is clear that Potatoes NZ, potato growers, food processors and research organisations will all get in behind any initiative that has tangible benefits proven to flow on to New Zealand businesses. However, at this point a more detailed industry analysis is required to tease out the costs and issues around the establishment of any potato starch processing facility. It appears that we have good growing conditions and capabilities, supported with good science but we lack a processing facility and this processing facility needs to be viable. A feasibility study of the establishment of a processing plant is required with detailed cost/benefit analysis undertaken to ensure that the investment will provide investors a viable return. This report has detailed some very initial costs and factors for consideration.

Understanding the potential of domestic substitution and forecasting exports is an important initial step. Establishment costs of a processing facility and likely returns require modeling once data is obtained, with consideration given to optimal location and potential investors and how partnerships may be facilitated. It is important to also understand returns to growers and their economic incentives, as they will not support any proposal without clear profit margins and confidence around supply arrangements.

To work with potato growers is a longer term initiative compared to working with existing processors with starch as a waste by-product. It is likely to take a number of years for growers to see financial returns as seed potatoes must be sourced, grown and tested and in addition there needs to be either modifications to an existing plant or the development of a specific purpose built export-orientated factory.

To scale up an initiative of using starch from waste by-product to meet export potential also requires further investigations as export orders have specific requirements around starch quality and characteristics. Massey University is currently working on this and has some tangible results and is in the best position to advise further on these requirements.

The next steps in deciding the feasibility of developing a potato starch industry include the formation of a working group. This group should begin by qualifying the level of investment that is required for the establishment of a starch processing plant; identifying likely investors and undertaking a cost/benefit analysis assessing options for location and how and where such a processing plant could be established. A number of businesses spoken too in the preparation of this report are keen to consider investment and it is clear that there is also international investment interest.

Whilst a lot of potential exists to diversify the trade of starch in New Zealand, a key question for consideration is, “should the initiative be around just potato starch especially as significant growth has been experienced with modified starches”? This report has not attempted to answer this question but recommends further investigation into the broader starch market as other starch opportunities may also exist that have not yet been fully investigated.

Conclusion

There is the sense of a growing demand for potato starch in the international market and New Zealand businesses are starting to seriously assess the opportunities that exist around this demand. Statistics NZ data illustrates a rising increase of potato starch imports into New Zealand and new emerging countries involved in this, such as Bangladesh. This report has highlighted the key markets and dominating players within the starch industry, noting increasing Asian market opportunities and interest. Given that New Zealand is located in the Southern Hemisphere perhaps an opportunity exists to partner with companies based in the Northern Hemisphere to provide potato starch during traditional off-peak season times. As noted earlier in this report most potato starch manufacturing facilities in the EU only operate for a few months of the year. The partner approach would leverage experience and expertise and could assist with facilitating market access.

Research has indicated that New Zealand is importing potato starch but clearly not in any large volumes. NZ Starch may in fact be correct in their observations that the domestic market is not where the real opportunity lies, however some import substitution is possible. A view towards the future is also important with the developments of biopolymers. Today’s statistical data does not illustrate the future as shown back in 1892 when potato starch was only considered as a substitute for corn flour and the key market being England. Further investigations into developments within the plastics industry seems to be warranted, as it is important to view the opportunity not in terms of today’s existing markets but to consider changing consumer demands and technological developments.

New Zealand appears to have the capacity to grow potatoes for starch, supplemented with an existing starch waste stream but does not have a processing plant available currently to handle export orientated starch processing. This is a major constraint to any initiative around potato starch. It is also

difficult to assess the capacity of such as processing plant as enquiries suggest much larger quantities than New Zealand is currently importing or producing and a more extensive review of this demand is required. If there is a Taiwanese company interested in investing in a processing plant in New Zealand then it is recommended that this is encouraged, especially if they are prepared to partner with existing processors and growers to support the industry overall. Even if this opportunity does not occur, it is recommended that a group of New Zealand businesses across sectors, work together collaboratively as a starting point establishing what level of returns are required and what investment that can gathered to support a potato starch initiative. Auckland Tourism, Events and Economic Development (ATEED), working alongside the Ministry of Primary Industries and Plant & Food Research, could assist with coordinating this collaboration especially if the initiative was to be developed in Auckland.

If a plant were to be developed, New Zealand is in a favorable position to exploit these opportunities as trade relations between New Zealand and Asian countries are good with New Zealand's free trade agreement with China providing an opportunity. However it is a very competitive environment dominated by large multinationals and so where possible strategic alliances are going to be important.

Industry Contacts

Thank you to the following people for their contribution to this report, either through allowing time for meetings or for providing information and data.

David Anstice, Food & Beverage, ATEED

Wendy Voegelin, Rural Development Specialist, ATEED

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Monty Spencer, Research & Innovation Manager, AS Wilcox

Neil Rogers, General Manager, New Zealand Starch

Mike Ringrose, Technical Manager, New Zealand Starch

Ron Gall, Business Manager, Potatoes New Zealand

Nada Young, Asia Market Director, Export Incite

Allan Hardacre, Research Officer, Institute of Food, Nutrition and Human Health.

Bill Griffin, Breeding and Genomics Portfolio Manager, Plant and Food Research Ltd

Appendix

Potato Starch Manufacturers

<i>Company</i>	<i>Description</i>	<i>Country-Region</i>
<i>Agrana Staerke GmbH</i>	<i>AGRANA Stärke GmbH is the operating company of the starch division with a potato starch factory in Gmünd, a corn starch factory in Aschach and a bioethanol plant in Pischelsdorf.</i>	<i>Austria</i>
<i>AKV Langholt (Andelskartoffelmelsfabrikken Vendsyssel)</i>	<i>AKV Langholt (Andelskartoffelmelsfabrikken Vendsyssel) is a Danish manufacturer of Potato Starch. AKV Langholt operates a Joint Venture with Cargill for the production of modified potato starch for non food applications. AKV's potato starch and potato protein are also sold through Cargill's distribution network.</i>	<i>Denmark</i>
<i>Almicor Ltd</i>	<i>Almicor is a potato starch manufacturer in Colombia</i>	<i>Colombia</i>
<i>Avebe</i>	<i>Avebe is a main manufacturer of potato starch, located in the Netherlands. Avebe sells native and modified potato starch globally for use in food, feed, paper, building, textiles and adhesives industries. This corporation has operations in 20 countries and employ around 2.000 people. Brand names include Solanic and Etenia.</i>	<i>Netherlands</i>
<i>Carolina Starches, LLC</i>	<i>Carolina Starches is a North American supplier of specialty potato starch derivatives for the Pulp and Paper and allied industries.</i>	<i>United States</i>
<i>Changhong Potato Starch Co., Ltd.</i>	<i>Changhong potato Starch Co Ltd. is a Chinese manufacturer in Hebei of native potato starch with an annual capacity of 5000 - 10000 metric tonnes.</i>	<i>China</i>
<i>China Essence Group Ltd</i>	<i>The China Essence Group is a Chinese manufacturer of potato starch, also producing a range of food products prepared from starch, such as vermicelli and noodles. The company also produces modified potato starch, potato protein and potato fiber. The China Essence Group is listed at the chinese stock exchange.</i>	<i>China</i>
<i>Emsland Group (Emsland-Stärke GmbH)</i>	<i>Emsland Group or Emsland Staerke; Emsland-Stärke GmbH is Germany's largest producer of potato starch. The company also manufactures dehydrated potato flakes and granules.</i>	<i>Germany</i>
<i>Finnamyl Oy</i>	<i>Finnamyl is a Finnish potato starch manufacturer, part of the CIBA concern (Raisio). Finnamyl also offers organic potato starch.</i>	<i>Finland</i>
<i>Gansu Xingda starch industry Company</i>	<i>Gansu Xingda starch industry Company is one of the larger Chinese potato starch producing companies, with and installed annual capacity of 40.000 tonnes potato starch.</i>	<i>China</i>
<i>Huhhot Huaou Starch products Co Ltd</i>	<i>Huhhot Huaou Starch Products Co Ltd is a manufacturer of potato starch located in Inner Mongolia, China</i>	<i>China</i>
<i>Inner Mongolia Nailun Agricultural Science and Technology Co., LTD</i>	<i>Inner Mongolia Nailun Agricultural Science and Technology Co., LTD is a manufacturer of potato starch and modified potato starch operating in China. The company has an annual production capacity of 100,000 tons potato starch and 20,000 tons modified starch.</i>	<i>China</i>

<i>Karup Kartoffelmelfabrik</i>	<i>Karup Kartoffelmelfabrik is a Danish manufacturer of potato starch</i>	<i>Denmark</i>
<i>KMC (Kartoffelmelcentralen)</i>	<i>KMC is a producer of potato starch and potato flakes, located in Denmark. KMC was founded on the basis of one single product – native potato starch. They have subsequently made regular additions to their range of products, and they now supply special ingredients to customers all over the world – primarily in the food sector but also in the manufacturing industry. KMC has the following Production sites: AKM Brande, KK Karup, AKS Toftlund KMC Derivat, KMC Granules, KMC Tapioca.</i>	<i>Denmark</i>
<i>Lyckeby Staerkelsen</i>	<i>The brand Lyckeby Stärkelsen is owned by Swedish Starch Producers, an incorporated association, owned by its members. These are about 840 starch potato growers in southern Sweden. The core operation is run under the joint brand Lyckeby Stärkelsen, and consists of production, development and marketing of starch and fibres for various purposes, primarily to the food, paper and chemical industries.</i>	<i>Sweden</i>
<i>Manitoba Starch Products</i>	<i>Manitoba Starch Products is the leading manufacturer of potato starch in Canada. The company is located near Carberry, Manitoba, in the heart of Canada and western Canadian potato production. The starch is extracted from (GMO-free) potatoes processed by Manitoba potato processing companies.</i>	<i>Canada</i>
<i>Nowamyl S.A. - Potato Processing Plant</i>	<i>Nowamyl is a Polish manufacturer of potato starch and maltodextrin.</i>	<i>Poland</i>
<i>Penford Food Ingredients</i>	<i>Penford Food Ingredients (PFI) offers a complete line of cost-effective starch, dextrose and dextrin ingredients based on corn, potato and tapioca starches.</i>	<i>United States</i>
<i>PEPEES JSC Starchworks</i>	<i>PEPEES JSC Starchworks is a potato starch manufacturer in Poland</i>	<i>Poland</i>
<i>PPZ "Trzemeszno"</i>	<i>Przedsiębiorstwo Przemysłu Ziemniaczanego „Trzemeszno” Sp. z o.o. (PPZ „Trzemeszno”) is a producer of potato starch in Poland</i>	<i>Poland</i>
<i>Przedsiębiorstwo Przemysłu Ziemniaczanego SA w Niechlowie</i>	<i>Przedsiębiorstwo Przemysłu Ziemniaczanego SA w Niechlowie is a potato starch manufacturer in Poland</i>	<i>Poland</i>
<i>Roquette</i>	<i>Roquette is a manufacturer of starch and starch derivatives from a variety of sources, including potatoes.</i>	<i>France</i>
<i>Runkai Xuanwei Starch Industry Company</i>	<i>Starch manufacturer in China with a starch factory in Yunnan, Xuanwei and one in Dali, Xiangyun (to be completed by the end of 2007). Runkai operated in joint venture with Avebe from 2002-2006.</i>	<i>China</i>
<i>Siddharth Starch</i>	<i>Siddharth Starch is currently the only manufacturer of native potato starch located in India. Siddharth Starch works with other potato processors on starch recovery. Siddharth Starch also offers its expertise in water reuse/recycling.</i>	<i>India</i>
<i>Solanyl Biopolymers Inc</i>	<i>Solanyl Biopolymers Inc. is a Canadian manufacturer of starch-based biodegradable polymers – Solanyl BP.</i>	<i>Canada</i>
<i>Suedstaerke GmbH</i>	<i>Suedstaerke GMBH operates the two Bavarian potato starch factories, Schrobenhausen and Sünching. These plants are the southernmost potato starch factories in Europe.</i>	<i>Germany</i>
<i>Western Polymer Corp.</i>	<i>Western Polymer Corporation (WPC) of Moses Lake, Washington, is the largest wet-end cationic potato starch supplier to the paper</i>	<i>United States</i>

	<i>industry in the U.S. Northwest. In addition, WPC supplies and services paper mills throughout the United States. Western Polymer Corp. currently purchases recovered potato starch from all major North American French fry and potato chip processors. Western Polymer Corp. has two facilities that receive recovered starch: Moses Lake, Washington and Grand Forks, North Dakota.</i>	
<i>Wielkopolskie Przedsiębiorstwo Przemysłu Ziemniaczanego S.A.</i>	<i>Wielkopolskie Przedsiębiorstwo Przemysłu Ziemniaczanego S.A. is a potato starch manufacturer in Poland</i>	<i>Poland</i>

Further Information Resources

- Global Starch Industry
May 2010**
Link to details: <http://www.reportlinker.com/p090565-summary/World-Starch-Market.html>
- Trends and Prospects in International Trade in Potato Starch
September 2011**
Link to details:
http://marketpublishers.com/report/consumers_goods/food_beverage/trends_n_prospects_4_world_trade_in_potato_starch.html
- Potato Starch: European Union Market Outlook 2011 and Forecast till 2016
July 2011**
Link to details:
http://marketpublishers.com/report/consumers_goods/food_beverage/potato_starch_european_union_market_outlook_2011_n_forecast_till_2016.html NB: the EU is the major producing region for potato starch

Potato Starch Opportunity Review

29/06/2012

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Terms of Reference

ATEED are working with industry partners to scope out the potential for developing an industry led initiative to develop potato starch production facilities in NZ. This would seek to capitalise on an activity with clear export development opportunities to supply growing demand for potato starch.

At this point the scope of the report is limited to providing headline data and information that can be used to justify further investment. It is envisaged that if this is successful that a more substantive study can be undertaken that looks at the specific areas of opportunity and how these can be accessed by the NZ consortium.

Lynda Fleming, working under contract to ATEED, contacted kMatrix to specifically address the following issues:

1. An overview of the size of the market - current & future. Within this to address high level issues on supply and demand factors.
2. Growth trends.
3. Industry structures.
4. Any high level information on the diversity of suppliers/customers
5. Any information that may relate to forecasts of the industry position and where there may be opportunities for NZ
6. Price assumptions and information related to historical and forecast margins.

Not all of this information is readily available. Where the request has already been covered off in the work already undertaken by Lynda Fleming we not covered it in this report. Issues around industry margins will require more detailed assessments of the current plants and their cost structures. This we could undertake at a later date.

Overview

Potato starch is produced by separating the starch from potato cell walls. There are two types of starch – Amylopectin and Amylose. Once removed the starch is dried and ground into a very fine white powder and directed towards a number of both industrial and food processes, or used in a liquid form. Different starches have properties that make them better for different uses. Therefore the paper and adhesives applications like the Amylopectin starch but not Amylose. This is driving research and development activity in Europe and the use of GM science to change develop consistency of potato starch that required by industrial applications. This will inevitably have a consequence for NZ given the current restrictions on GM activity. This may close off some of the market opportunities, some of which are high value.

Potato starch is currently used by the food processing industry as a general thickener, binder, texturiser, anti-caking or gelling agent. It also shows up in finished products such as snack foods, processed meats, baked goods, noodles, pet foods, shredded cheese, sauces, gravies and soups. Potato starches are also used in yeast filtration and as additives in the cosmetics and pharmaceutical industries.

Key uses of potato starch

- Paper and packaging – in this area potato starch can improve technical properties of paper (eg firmness) and form the basis of bio-packaging. There are expected to be significant opportunities in the bio-plastics area as a result of the increased desire to find alternatives to oil derived plastics. This could increase the demand to up to 2m tons, much of which is expected to come from potatoes. Related to this is the use of starch in the production of items like golf tees given their biodegradable nature.
- Biotechnology – potato starch is a neutral substance and so is well suited as a substrate on which micro organisms can grow. Also as the desire to find alternatives to oil potato starch has applications for the production of bio-ethanol.
- Textiles – it provides abrasion resistance and smoothness to cloth.
- Pharmaceutical – potato starch improves the dissolving properties of tablets
- Detergents – potato starch can be used to manufacture bio-plastics given its ability to be a bio-degradable alternative for sugar detergents.
- Oil drilling – potato starch has opportunities to be used as a drilling fluid.

Food

Potato starch has a number of attributes that are tending to increase its demand in the food sector:

1. It is gluten free so it has particularly strong opportunities for those increasing number of people in the community that have gluten free or and restricted diets.
2. Equally its use as a gelling agent makes it relevant for the preparation of vegetarian meals.
3. It has a higher heat point than cornstarch. This makes it attractive in a number of areas for prepared foods.

4. It is considered kosher for Passover. So in a similar way to gluten it is used to ensure that certain markets are not closed off to food manufacturers.

Industrial

Given the wider move to environmentally friendly packaging there is evidence of increased use of potato starch given its properties as its use in the manufacture of bio-plastics. In the US, New Ice, a newly established US developer of compostable food packaging, is to launch new class potato-starch based compostable containers for dry, damp or wet foods.

Around 15% of the total world paper starch comes from potato. Paper mills usually purchase starch in dry powder form and cook it onsite prior to application. The Global paper industry uses approximately 5 million ton a year (2005 estimate) of starch. The science and R+D are underway to modify starches to ensure better utility and functionality. This trend to improve quality and productivity will increase demand especially given the desire to meet or exceed rising environmental standards.

Starch can be used to improve fabrics and textiles – it can provide abrasion-resistance and smoothness, according to Bayer Crop Science. Potato starch is used in the cosmetics and pharmaceuticals sector in the production of creams, pastes and powders. It can also be used to reduce the need for chemical additives in beauty and pharmaceutical products.

Potato starch is used as the starting material for biodegradable sugar detergents. Starch's absorbent powers allow it to absorb stains from fabrics better than other cleaning substances.

Productivity

Potato starch production is a contributor to sustainable development. Potatoes provide a high starch yield per acre. For example, potato starch provides 7 tons of starch compared to 4-5 tons from wheat or corn, according to Bayer Crop Science.

Value of production

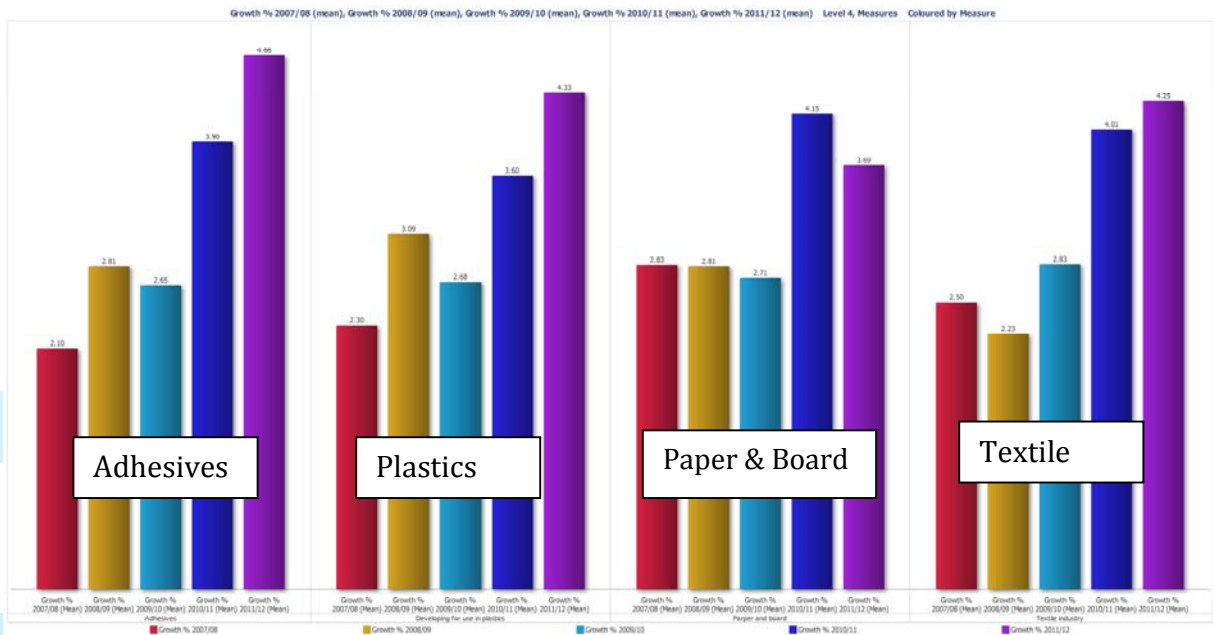
The Global Native Starch Production is valued at £28bn, with potato making up around 4%, or around £1.12bn, behind corn that provides around 75% of starch output. Potato growing costs account for more than 65% of potato starch production costs of native starch.

The other dimension of value is of the markets that use the starch. kMatrix has undertaken detailed analysis for the Department of Environment, Food and Rural Affairs (DEFRA) in the UK on the non-food uses of plants and crops. This work did not specifically look at potato starch, it did though contain data about the nature and scope of the non-food application of the potato in the UK. A parallel analysis is possible across the value chain looking specifically at the use of potato starch across all of the top global economies.

Growth in the non-food use of potato – UK (2007/08)



Expected growth in the UK non-food use of potato through to 2011/12



In addition to this work kMatrix has undertaken a detailed assessment of the food industry. This information is slightly dated but it illustrates the size of the total starch activity. This is all forms of starch production for the food sector only. Therefore it does not include any of the markets noted above as non-food.

In the table below we have quantified the total market activity for all starches.

Food & Drink		2006/ 7		Forecast Market Size				
		Total £m	Available £m	2007/ 08	2008/ 09	2009/ 10	2010/ 11	2011/ 12
US	Production of Starch	4170.20	1415.87	4338.34	4519.60	4722.30	4938.84	5199.72
Europe	Production of Starch	5658.75	4522.50	6120.62	6628.41	7194.71	7829.71	8656.84

Employment

The EU potato starch industry is estimated to provide:

- Provides income to 14,000 farmers
- Involves in total 4,000 employees

Production areas

Europe is a key market area for the production of potato starch. There have historically been subsidies available from the EU that has nurtured the industry and given it some protection. These are in the process of being removed. As a result it can be expected that changes will occur. China has seen strong growth and use of potato starch.

The EU produces 9 million tons of starch per year (2008 figures), of which around 20% is derived from potatoes, with the rest largely from corn and wheat. Because of the recent past of subsidies the production of potato starch in the EU has been fixed by quotas – the total amount is almost 2 million tons. The key production areas are:

- Germany - 656,000 tons,
- Netherlands - 507,000 tons and
- France 265,000 tons.

Use of potato Starch

Potato starch use is fairly evenly split between food and industrial purposes.

Use	Millions of tons
Paper & Carton	7.8
Other Food	5.5
Corrugated Board	2.5
Other Technical	2.5
Noodles	1.8
Processed Meat	1.4
Bakery	1.4

Global market for potato starch

Potato starch is an issue in trade relations between the EU and China:

1. A report on a meeting of the EU advisory group on Starch held in 2010 discusses how China has been actively challenging the EU potato starch industry, opening an investigation on anti-subsidy against the EU. Several aid schemes have been challenged; these include aid to producers of starch potatoes, aid given for exporting potato starch and particularly aid given by France and the Netherlands to their producers. These national subsidies and interventions may potentially exist after the EU subsidies have been removed.
2. China Daily reported in May 2011 that China would impose an anti-subsidy tariff on potato starch imported from the EU.

China is a significant producer of potatoes, however the competition from EU exporters selling potato starch at below-cost, or a dumped price in the Chinese market was thought to be seriously damaging development of the domestic market. Potato starch imported from the EU was priced at \$430 a ton in China in 2010, which accounted for 30% of the exporters' total cost. The domestic market price for potato starch in China was \$1,800 a ton. China blamed the EU potato starch subsidies of enabling them to produce a margin despite selling at a price far below the local market price. EU supplied potato starch holds 40% of the market share in China. China expects its demand for potato starch to reach 1.2 million tons annually by 2015, which is double the demand in 2011.

Global trade and production of Starch

A paper to the world Tapioca Conference in June 2011 summarises well the global trading position for native starch as opposed to native and modified starch:

The total native starch production was:

Source	Production m tons
Corn	13
Tapioca	8
Potato	1.5
Wheat	1

Of this production the majority was occurring in the EU and China with smaller volumes produced in Japan, the US and Canada. In the EU 82% of total production is from Germany, Holland and France, but there is also activity in Latvia, Czech Republic, Austria, Finland, Sweden, Poland and Denmark. The EU produced 1.6m tons of potato starch in 2008, and exported 626,000 tons. Germany exports around 40% of their production.

The total global production of native potato starch has not changed a great deal over the period 2000-2010. However, the nature of the total market for starch is and that is creating opportunities. The largest source is corn and much of this comes from the US. However as they are the largest user most of this remain in the US, however, the potential to export its starch is restricted given that it is GM sourced. This means that the proportion of potato starch that is exported in relation to its production is high, so in the case of potato starch it is 7% of the total production but 19% of global native starch exports.

Market for Potato Starch

The markets for potato starch are largest in the US and China but also include opportunities in:

- Russia
- South Korea
- Philippines
- Malaysia
- Indonesia
- Taiwan
- Mexico
- Brazil
- India
- Japan

The largest and growing market for starch is in China. They have restricted the use of corn in industrial purposes that is having a knock on effect of increasing demand for other starch sources. China's demand for starch is increasing at a rate of 10% pa.

As a result prices have trended upwards. In the case of potato starch this has increased from around US\$375 in 2000 to US\$600 in 2010 and prices of over a US\$1,000 in 2011. This can also reflect the vulnerability of potato crops to weather conditions. The largest exporter of potato starch is the EU, having increased its export from 400,000 tons in 2000 to 600,000 in 2010. The amount exported from US, China and Canada is small.

Research and Development

We have not undertaken an extensive search looking at the potato starch R+D activity. What we have sought to do is establish the nature of investments that are publicly know about. This highlights that there is strong interest in the following area:

1. BASF is actively looking at GM potatoes designed to facilitate the development of a consistent type of starch that they believe will have enhanced value. One of these is Amflora that is projected to result in added value of €2,000 per hectare. Avebe and BASF, have initiated joint R+D optimized amylopectin starch potato using GM technology.
2. The Agriculture and Agri-Foods Canada who are looking at the structure and properties of potato starch and to develop new uses in food processing, pharmaceutical and industrial applications. They are looking at the properties of 'Resistant starch', that is the starch in starchy foods that is not digested or absorbed in the small intestine. This resistant starch reaches the large intestine essentially intact where it is considered to have similar physiological effects and health benefits of fibre – that is, provides bulk, protects against colon cancer, improves glucose tolerance and insulin sensitivity, and lowers plasma cholesterol and triglyceride concentrations.
3. The Canadian scientists are also developing effective, high performance and environmentally-friendly packaging materials from thermoplastic starch blends in collaboration with McMaster University in Hamilton. The objectives of the research are to develop potato polysaccharide based bio-plastic film and foam (based on complex carbohydrates found in plants), and to improve the performance of potato-based bio-plastic.

The focal point of R+D is upon adding value to potato starch and is designed to improve its position in higher value supply chains like pharmaceuticals.

Future opportunities that can be supported by kMatrix



We have provided an overview of the potato starch and to a limited degree the overall potato and the overall starch markets. This illustrates that there is significant global potential that is evidenced by increasing demand and production. To explore the business case for developing potato starch production in NZ it will be necessary to assess in more detail the market segments and tracking of activity. Therefore we would recommend that further work is undertaken designed to:

1. Quantify the market for potato starch by use eg how much of the global and regional output goes into which market segment eg drugs, paper and packaging etc.
2. What are the growth trends in each of these market segments?
3. Which countries import potato starch and for what purpose. Above this it is important to understand which countries are likely to increase their importation of potato starch as a result of wider changes in their economy eg changes in food production or the development of bio-plastic activity that will result in increased demand for potato starch to ensure that NZ looks at emerging market opportunities rather than competing in an existing market.
4. What are the price trends in potato starch and what are the returns that can be achieved? What are the cost structures and the ability to develop further value added activity in NZ taking into account cost of production and transport from NZ? Global literature discusses the total but deals less with the economics of production. This is clearly likely to change as a result of the changes in the quota and subsidy regime in the EU.
5. An exploration of the market potential for increased use of potato starch by market. Potato starch is used in some of the largest global sectors. The functionality of potato starch as opposed to other starches in terms of low fat, protein, colour and taste mean that it has wider potential that should be investigated and positioned with potential users. Therefore it will be important to consider what these market niches are and consider what would it take for NZ potato starch to compete in these emerging opportunities.
6. Tied to this is an understanding of what the trends in potato starch research and development are and what the purpose/goals of this research. This will provide a strong steer as to the longer term use of potato starch and what new markets will emerge.

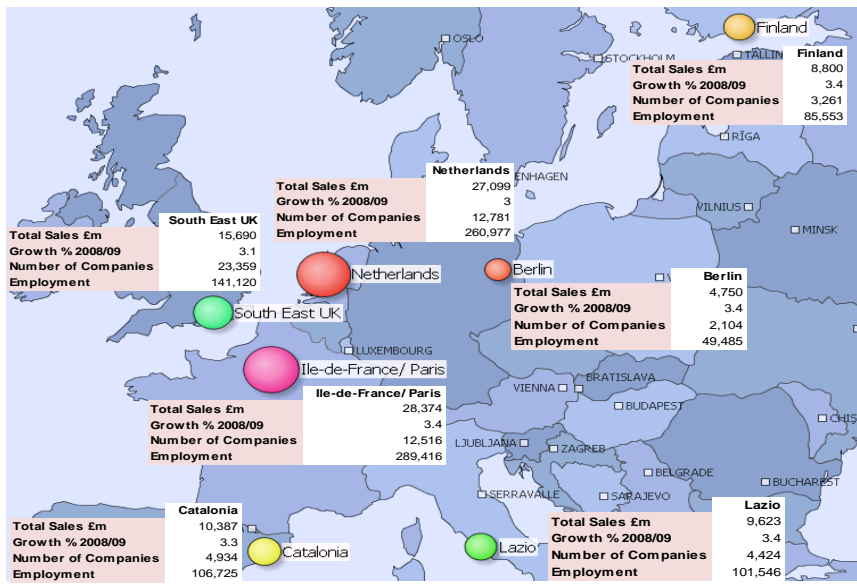
kMatrix is able to provide product and market level data that use or could use potato starch. This data can be divided by country and by region. Such information would be valuable in producing the business case for an investment into potato starch development in NZ. In this we are able to map global trade patterns in potato starch, who imports and who exports and where they import from and for what purpose. This would allow the NZ industry to effectively target its activity and marketing.

Using our global data sources we are able to map international sales and markets for all sector products and services. When combined with our international trade data (imports and exports) and growth data this provides a good understanding of global competitiveness across the sector.



International Markets 1

International data is also available at the regional level for top 60 global economies. This enables benchmarking between Regions and City Regions Performance as well as more detailed targeting of overseas trade initiatives.



International Markets 4

Knowledge Matrix

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**Harmonised Trade - Exports (Aggregated
Monthly - Financial Year)**

	Starch; potato Quantity
2003	
Samoa	340
2004	
Australia	1,875
2006	
Australia	20,000
2007	
Australia	2,000
Fiji	60
2008	
Australia	4,083,343
Japan	80,000
Taiwan	35,100
2009	
Australia	2,209,080
French Polynesia	425
United States of America	110
2010	
Australia	2,539,398
Fiji	3,705
Thailand	9,000
2011	
Australia	2,021,863
2012	
Australia	2,377,815

Table information:

Units:

Quantity: Number, Magnitude = Units (in 1s)

Footnotes:

Year ended June

Quantity unit:

Code 1108130000: Kgms

Data is provisional for the three most recently released months.

Aggregated Harmonised System (HS) codes may include confidential 10 digit codes, in which case the summed data will exclude the confidential value(s).

For more information, please see
www.stats.govt.nz/trade

Symbols:

.. figure not available

C: Confidential

E: Early Estimate

P: Provisional

R: Revised

S: Suppressed

N: No applicable data can be displayed

Table reference:

TEX001F

Last updated:

Quantity: 25 July 2012 10:45am

Source: Statistics New Zealand

Contact: Information Centre

Telephone: 0508 525 525

[Email:info@stats.govt.nz](mailto:info@stats.govt.nz)

List of importers for the selected product

Product : 110813 Potato starch

Sources : ITC calculations based on COMTRADE statistics.

The world aggregation represents the sum of reporting and non reporting countries

Data based on the partner reported data (Mirror data) are shown in orange

Unit : US Dollar thousand

Importers	Imported value in 2006	Imported value in 2007	Imported value in 2008
World	427376	465943	571653
China	25956	6156	8137
United States of America	40811	48895	51509
Netherlands	18442	32408	55005
United Kingdom	40156	45509	47426
Republic of Korea	19588	20378	26045
Chinese Taipei	15011	15628	21956
Italy	17818	22306	24896
Germany	17078	23351	31157
Spain	18325	21359	29485
Mexico	10849	14886	15303
Belgium	9178	11693	15111
Russian Federation	10276	6439	7853
Thailand	10180	9722	12396
France	15768	15951	22232
Sweden	7944	9360	12136
Hong Kong, China	11849	15260	14121
Malaysia	5664	8377	7414
Viet Nam	2494	2337	1548
Indonesia	4226	8284	9228
Switzerland	7899	4119	11687
Japan	18117	5931	1827
Canada	3616	4302	7443
Peru	6248	0	14418
Poland	9851	8351	9531
Ukraine	3344	2519	6330
Turkey	3459	4249	5351
Philippines	3701	5599	5711
Australia	3195	4803	5226
Belarus	7054	4970	2650
Latvia	1338	1948	4373
Czech Republic	2449	3560	5449
Morocco	1199	5909	1532
Lithuania	4548	3426	2903
Greece	2374	3114	4457
South Africa	1547	1941	1465
Finland	1336	433	1072
Israel	2042	3235	2713

Importers	Imported value in 2006	Imported value in 2007	Imported value in 2008
Singapore	2003	3416	3265
Jordan	830	1113	1686
Austria	3750	5158	7217
Estonia	1071	1424	1660
Colombia	1473	790	1309
Hungary	1256	1816	2302
Dominican Republic	1075	1500	1750
Romania	3153	3434	3767
Pakistan	1486	2039	1591
Argentina	943	1594	2327
Bulgaria	1514	2112	623
Portugal	829	1434	1734
Denmark	1355	1123	1673
Costa Rica	957	1316	1955
Kazakhstan	889	1061	1264
New Zealand	962	1908	1830
Uzbekistan	626	918	1612
Saudi Arabia	953	1965	0
Ireland	1682	2779	2645
Lebanon	959	2429	2145
Slovakia	2138	4490	4398
Brazil	580	1132	1283
Bangladesh	663	143	277
Algeria	414	56	321
Uruguay	508	811	790
Syrian Arab Republic	833	839	1365
Venezuela	548		594
Chile	436	646	683
Serbia	671	1301	1330
Bahrain	667	1037	
Slovenia	910	520	631
Guatemala	536	650	919
Luxembourg	316	357	580
El Salvador	267	300	445
Republic of Moldova	383	690	617
Honduras	157	276	518
United Arab Emirates		310	374
Ecuador	664	214	350
Azerbaijan	181	43	108
Cuba	584	286	146
Tunisia	7	28	39
Egypt			1405
Palestine		492	664
Bosnia and Herzegovina	146	212	301
Mongolia	37	51	74
Panama	54	66	59
India	321	578	444
Albania	220	177	482

Importers	Imported value in 2006	Imported value in 2007	Imported value in 2008
Paraguay	111	112	229
Nigeria	0	60	104
The former Yugoslav Republic of Macedonia	191	291	
Croatia	150	273	311
Cyprus	141	178	183
Iran (Islamic Republic of)	0	78	80
Georgia	163	55	89
Iceland	169	139	195
Armenia	4	4	55
Cambodia			77
Sudan	36		62
Botswana	7	6	
Trinidad and Tobago	43	65	116
Malta	51	108	73
Tajikistan		1	1
Libyan Arab Jamahiriya			
Norway	19	4	0
Kyrgyzstan	6	42	14
Montenegro	1	4	46
Kuwait	48	117	87
Senegal	25	70	79
Nicaragua	36	43	36
Macao, China	17	91	21
Turkmenistan	54	71	23
Democratic People's Republic of Korea	19	9	
Maldives	1	0	1
New Caledonia	19	13	16
French Polynesia	20	30	43
Brunei Darussalam	34	62	53
Cape Verde	22	18	
Angola	5	10	34
Kenya	25	58	45
Yemen	32	8	3
Zambia	0	0	0
Dominica	0	0	0
Bahamas	5	3	4
Mauritius	10	14	17
Antigua and Barbuda		0	5
Djibouti			
Myanmar	2	19	
Malawi	1	7	6
Côte d'Ivoire	14	55	7
Aruba			
Fiji	1	2	5
United Republic of Tanzania	0	0	0
Tonga		2	3

Importers	Imported value in 2006	Imported value in 2007	Imported value in 2008
Ship stores and bunkers	1	1	1
Oman	0	2	0
Papua New Guinea	16	64	10
Nepal			
Iraq	11	11	50
Guyana	0	0	0
Burundi	0	0	0
United States Minor Outlying Islands	21	23	12
Uganda	2	0	11
Ghana	4	0	1
Ethiopia	0	0	0
Sri Lanka	24	0	2
Benin	0	3	3
Mozambique	18	1	1
Guinea-Bissau	1	3	
Saint Helena			
Madagascar	1	3	1
Barbados	2	1	0
Bolivia	0	0	76
Burkina Faso		0	0
Tuvalu			
Zimbabwe	0	5	1
Tokelau			
Seychelles	1		2
Suriname			
Swaziland	34	27	
Bermuda			24
Andorra			26
Belize	1	5	9
Solomon Islands			
British Virgin Islands			16
Cayman Islands			7
Cameroon	1	139	48
Mayotte	0	1	0
Democratic Republic of the Congo		2	
Cook Islands			
Faroe Islands	16	19	19
Gibraltar		19	
Greenland	2	4	
French South Antarctic Territories			
Gabon	26		
Lesotho		17	
Liberia	29		
Mali	0	0	1
Jamaica	3	40	18

Importers	Imported value in 2006	Imported value in 2007	Imported value in 2008
Anguilla			
Saint Lucia	1	1	0
Qatar	0	0	18
Northern Mariana Islands		2	4
Africa not elsewhere specified			
Oceania Nes		19	22
Namibia	11	21	23
Nauru	1	1	
Neutral Zone		1	
Netherland Antilles	42	51	38
Vanuatu	1	2	

List of importers for the selected product

Product : 110813 Potato starch

Sources : ITC calculations based on COMTRADE statistics.

The world aggregation represents the sum of reporting and non reporting countries

Data based on the partner reported data (Mirror data) are shown in orange

Unit : US Dollar thousand

Importers	Imported value in 2009	Imported value in 2010	CAGR 2006 - 2010	Share in value in world's imports, % in 2010
World	480519	564269	7.2%	100
China	16304	64647	25.6%	11.5
United States of America	49689	46687	3.4%	8.3
Netherlands	41807	35117	17.5%	6.2
United Kingdom	31137	34835	-3.5%	6.2
Republic of Korea	26840	33045	14.0%	5.9
Chinese Taipei	20671	22609	10.8%	4
Italy	19468	22011	5.4%	3.9
Germany	21979	19717	3.7%	3.5
Spain	20595	18162	-0.2%	3.2
Mexico	12498	15021	8.5%	2.7
Belgium	14876	14611	12.3%	2.6
Russian Federation	10695	14067	8.2%	2.5
Thailand	9332	13832	8.0%	2.5
France	16574	13629	-3.6%	2.4
Sweden	10438	11626	10.0%	2.1
Hong Kong, China	10807	10170	-3.7%	1.8
Malaysia	7543	9264	13.1%	1.6
Viet Nam	1794	8620	36.3%	1.5
Indonesia	7701	8512	19.1%	1.5
Switzerland	9279	7879	-0.1%	1.4
Japan	6739	7385	-20.1%	1.3
Canada	7280	7071	18.3%	1.3
Peru	6300	6843	2.3%	1.2
Poland	6201	6470	-10.0%	1.1
Ukraine	5361	6344	17.4%	1.1
Turkey	4795	5332	11.4%	0.9
Philippines	4694	5280	9.3%	0.9
Australia	4307	4960	11.6%	0.9
Belarus	1824	4640	-9.9%	0.8
Latvia	2900	4456	35.1%	0.8
Czech Republic	3735	4137	14.0%	0.7
Morocco	1167	3880	34.1%	0.7
Lithuania	2508	3736	-4.8%	0.7
Greece	2727	3244	8.1%	0.6
South Africa	1254	3202	19.9%	0.6
Finland	1777	3154	24.0%	0.6
Israel	2844	3072	10.7%	0.5

Importers	Imported value in 2009	Imported value in 2010	CAGR 2006 - 2010	Share in value in world's imports, % in 2010
Singapore	2415	2954	10.2%	0.5
Jordan	1497	2953	37.3%	0.5
Austria	3494	2816	-6.9%	0.5
Estonia	2097	2400	22.4%	0.4
Colombia	1397	2264	11.3%	0.4
Hungary	2010	2253	15.7%	0.4
Dominican Republic	1030	2005	16.9%	0.4
Romania	2121	1977	-11.0%	0.4
Pakistan	1414	1860	5.8%	0.3
Argentina	2261	1826	18.0%	0.3
Bulgaria	1597	1739	3.5%	0.3
Portugal	1394	1613	18.1%	0.3
Denmark	1392	1555	3.5%	0.3
Costa Rica	778	1472	11.4%	0.3
Kazakhstan	1362	1460	13.2%	0.3
New Zealand	1442	1386	9.6%	0.2
Uzbekistan	1838	1386	22.0%	0.2
Saudi Arabia	0	1368	9.5%	0.2
Ireland	1682	1329	-5.7%	0.2
Lebanon	3514	1225	6.3%	0.2
Slovakia	2004	1212	-13.2%	0.2
Brazil	1304	1126	18.0%	0.2
Bangladesh	239	1088	13.2%	0.2
Algeria	749	899	21.4%	0.2
Uruguay	452	887	15.0%	0.2
Syrian Arab Republic	1568	884	1.5%	0.2
Venezuela	1228	869	12.2%	0.2
Chile	623	654	10.7%	0.1
Serbia	685	650	-0.8%	0.1
Bahrain	629	625	-1.6%	0.1
Slovenia	677	581	-10.6%	0.1
Guatemala	547	576	1.8%	0.1
Luxembourg	490	570	15.9%	0.1
El Salvador	261	533	18.9%	0.1
Republic of Moldova	353	512	7.5%	0.1
Honduras	330	401	26.4%	0.1
United Arab Emirates	660	373		0.1
Ecuador	391	372	-13.5%	0.1
Azerbaijan	136	358	18.6%	0.1
Cuba	144	315	-14.3%	0.1
Tunisia	20	313	158.6%	0.1
Egypt	531	289		0.1
Palestine	395	285		0.1
Bosnia and Herzegovina	344	283	18.0%	0.1
Mongolia	168	281	66.0%	0
Panama	98	277	50.5%	0
India	547	277	-3.6%	0
Albania	299	269	5.2%	0

Importers	Imported value in 2009	Imported value in 2010	CAGR 2006 - 2010	Share in value in world's imports, % in 2010
Paraguay	288	267	24.5%	0
Nigeria	50	259		0
The former Yugoslav Republic of Macedonia	291	243	6.2%	0
Croatia	264	226	10.8%	0
Cyprus	213	210	10.5%	0
Iran (Islamic Republic of)	134	205		0
Georgia	38	202	5.5%	0
Iceland	185	161	-1.2%	0
Armenia	60	145	145.4%	0
Cambodia	171	134	#DIV/0!	0
Sudan	56	132	38.4%	0
Botswana	60	117	102.2%	0
Trinidad and Tobago	41	98	22.9%	0
Malta	81	88	14.6%	0
Tajikistan	41	84		0
Libyan Arab Jamahiriya		65		0
Norway	5	59	32.7%	0
Kyrgyzstan	114	56	74.8%	0
Montenegro	80	55	172.3%	0
Kuwait	54	54	3.0%	0
Senegal	48	52	20.1%	0
Nicaragua	29	47	6.9%	0
Macao, China	6	33	18.0%	0
Turkmenistan	10	33	-11.6%	0
Democratic People's Republic of Korea	177	30	12.1%	0
Maldives	1	24	121.3%	0
New Caledonia	18	24	6.0%	0
French Polynesia	25	24	4.7%	0
Brunei Darussalam	29	23	-9.3%	0
Cape Verde	16	23	1.1%	0
Angola	44	23	46.5%	0
Kenya	15	20	-5.4%	0
Yemen	0	19	-12.2%	0
Zambia	1	18		0
Dominica	0	18		0
Bahamas	5	16	33.7%	0
Mauritius	22	15	10.7%	0
Antigua and Barbuda	25	13		0
Djibouti	179	13		0
Myanmar	34	8	41.4%	0
Malawi	5	8	68.2%	0
Côte d'Ivoire	3	8	-13.1%	0
Aruba	5	6		0
Fiji	2	5	49.5%	0
United Republic of Tanzania	1	5		0
Tonga	1	5		0

Importers	Imported value in 2009	Imported value in 2010	CAGR 2006 - 2010	Share in value in world's imports, % in 2010
Ship stores and bunkers	4	4	41.4%	0
Oman	0	4		0
Papua New Guinea	2	3	-34.2%	0
Nepal	1	2		0
Iraq	30	2	-34.7%	0
Guyana	3	2		0
Burundi	0	2		0
United States Minor Outlying Islands	13	2	-44.4%	0
Uganda	0	1	-15.9%	0
Ghana	2	1	-29.3%	0
Ethiopia	0	1		0
Sri Lanka	3	1	-54.8%	0
Benin		1		0
Mozambique	1	1	-51.5%	0
Guinea-Bissau	2	1	0.0%	0
Saint Helena		1		0
Madagascar	1	0	-100.0%	0
Barbados	1	0	-100.0%	0
Bolivia	0	0		0
Burkina Faso	4	0		0
Tuvalu	10			
Zimbabwe	0			
Tokelau	10			
Seychelles			-100.0%	
Suriname	11			
Swaziland			-100.0%	
Bermuda				
Andorra				
Belize			-100.0%	
Solomon Islands	1			
British Virgin Islands				
Cayman Islands				
Cameroon	264		-100.0%	
Mayotte	1			
Democratic Republic of the Congo	4			
Cook Islands	29			
Faroe Islands	19		-100.0%	
Gibraltar				
Greenland			-100.0%	
French South Antarctic Territories	27			
Gabon			-100.0%	
Lesotho				
Liberia			-100.0%	
Mali				
Jamaica	11		-100.0%	

Importers	Imported value in 2009	Imported value in 2010	CAGR 2006 - 2010	Share in value in world's imports, % in 2010
Anguilla	19			
Saint Lucia	3		-100.0%	
Qatar				
Northern Mariana Islands				
Africa not elsewhere specified	39			
Oceania Nes	16			
Namibia			-100.0%	
Nauru			-100.0%	
Neutral Zone				
Netherland Antilles	14		-100.0%	
Vanuatu			-100.0%	

	2002			2003		
	Quantity	Cost including insurance and freight	Value for duty	Quantity	Cost including insurance and freight	Value for duty
Australia	20,000	31,912	27,082	20,000	23,548	22,391
Austria	0	0	0	750	2,570	2,372
Bangladesh	0	0	0	0	0	0
Belgium	0	0	0	0	0	0
China, People's Republic of	2,775	14,095	12,994	7,318	10,015	9,332
Czech Republic	0	0	0	0	0	0
Denmark	63,000	65,522	54,114	44,000	38,915	33,104
Finland	0	0	0	0	0	0
France	0	0	0	0	0	0
Germany	205,175	236,738	203,829	142,000	156,777	135,696
Hong Kong (Special Administrative Region)	7,885	36,073	34,634	3,655	15,083	14,398
India	0	0	0	0	0	0
Iran	0	0	0	0	0	0
Israel	0	0	0	0	0	0
Japan	473	2,891	2,793	839	5,570	5,302
Korea, Republic of	10	18	17	0	0	0
Malaysia	0	0	0	0	0	0
Mongolia	0	0	0	0	0	0
Netherlands	1,461,400	1,627,335	1,409,275	1,671,718	1,610,032	1,422,461
New Zealand	0	0	0	0	0	0
Poland	0	0	0	42,000	33,836	28,633
Singapore	0	0	0	0	0	0
South Africa	0	0	0	0	0	0
Taiwan	1,000	1,159	1,079	1,018	899	864
Thailand	0	0	0	0	0	0
United Arab Emirates	0	0	0	0	0	0
United Kingdom	0	0	0	0	0	0
United States of America	23	4,402	4,123	1	384	369
Total	1,761,741	2,020,145	1,749,940	1,933,299	1,897,629	1,674,922

	2004			2005		
	Quantity	Cost including insurance and freight	Value for duty	Quantity	Cost including insurance and freight	Value for duty
Australia	23,262	30,035	28,906	19,003	8,595	6,740
Austria	0	0	0	0	0	0
Bangladesh	0	0	0	0	0	0
Belgium	0	0	0	0	0	0
China, People's Republic of	2,624	6,241	5,875	8,104	11,995	11,006
Czech Republic	0	0	0	0	0	0
Denmark	0	0	0	0	0	0
Finland	0	0	0	0	0	0
France	0	0	0	0	0	0
Germany	214,050	181,207	159,156	360,340	317,590	274,072
Hong Kong (Special Administrative Region)	4,085	12,279	11,539	2,685	7,338	6,855
India	0	0	0	0	0	0
Iran	0	0	0	0	0	0
Israel	0	0	0	0	0	0
Japan	948	5,200	5,026	505	3,261	3,148
Korea, Republic of	50	83	77	180	398	368
Malaysia	0	0	0	113	149	131
Mongolia	0	0	0	0	0	0
Netherlands	1,744,250	1,557,194	1,387,375	985,204	937,671	837,329
New Zealand	0	0	0	0	0	0
Poland	105,000	90,472	80,180	0	0	0
Singapore	5	37	34	0	0	0
South Africa	32,400	27,502	24,133	0	0	0
Taiwan	1,731	3,376	3,223	1,622	2,509	2,322
Thailand	0	0	0	20,000	19,337	17,361
United Arab Emirates	0	0	0	0	0	0
United Kingdom	0	0	0	0	0	0
United States of America	24	1,750	1,648	1	140	128
Total	2,128,429	1,915,376	1,707,172	1,397,757	1,308,983	1,159,460

Harmonised Trade - Imports (Aggregated Monthly - Financial Year)						
	Starch; potato					
	2006			2007		
	Quantity	Cost including insurance and freight	Value for duty	Quantity	Cost including insurance and freight	Value for duty
Australia	20,004	10,969	8,464	18,008	23,460	21,368
Austria	0	0	0	0	0	0
Bangladesh	0	0	0	0	0	0
Belgium	0	0	0	0	0	0
China, People's Republic of	3,606	5,774	5,239	69,693	69,198	62,686
Czech Republic	0	0	0	0	0	0
Denmark	1,000	860	848	18,000	23,953	21,635
Finland	0	0	0	1,000	3,101	2,981
France	0	0	0	0	0	0
Germany	593,732	491,087	406,936	629,125	663,647	583,978
Hong Kong (Special Administrative Region)	1,301	3,093	2,932	2,408	4,408	3,985
India	0	34	30	0	0	0
Iran	0	0	0	0	0	0
Israel	0	0	0	0	0	0
Japan	469	2,068	1,972	1,242	4,336	4,142
Korea, Republic of	80	624	533	254	1,228	1,133
Malaysia	553	845	753	0	0	0
Mongolia	0	0	0	0	0	0
Netherlands	769,967	657,098	575,301	873,057	1,057,635	969,755
New Zealand	0	0	0	0	0	0
Poland	0	0	0	11	20	19
Singapore	0	0	0	20	47	43
South Africa	0	0	0	0	0	0
Taiwan	2,359	3,486	3,181	2,146	3,032	2,808
Thailand	200	112	101	454	273	262
United Arab Emirates	0	0	0	0	0	0
United Kingdom	0	0	0	18,900	28,141	22,625
United States of America	187	561	462	54,000	55,924	48,640
Total	1,393,458	1,176,611	1,006,752	1,688,318	1,938,403	1,746,060

	2008			2009		
	Quantity	Cost including insurance and freight	Value for duty	Quantity	Cost including insurance and freight	Value for duty
Australia	18,463	32,088	28,330	82,123	39,105	33,115
Austria	0	0	0	0	0	0
Bangladesh	0	0	0	0	0	0
Belgium	0	0	0	0	0	0
China, People's Republic of	88,225	97,879	90,105	63,560	88,885	81,759
Czech Republic	0	0	0	0	0	0
Denmark	0	0	0	0	0	0
Finland	510	1,468	1,395	125	660	596
France	155,760	201,027	174,684	123,000	137,564	118,660
Germany	755,452	1,033,233	945,455	818,240	969,432	863,256
Hong Kong (Special Administrative Region)	3,045	5,788	5,560	4,031	9,890	9,536
India	0	0	0	0	0	0
Iran	0	0	0	100	88	74
Israel	0	0	0	0	0	0
Japan	1,509	5,528	5,295	885	4,920	4,770
Korea, Republic of	1,641	5,052	4,812	925	3,993	3,805
Malaysia	0	0	0	0	0	0
Mongolia	132,000	140,440	130,418	22,000	22,386	20,866
Netherlands	905,386	1,239,987	1,150,613	761,986	1,043,164	919,043
New Zealand	0	0	0	83,570	39,840	34,463
Poland	42,032	49,604	45,351	21,000	25,657	23,061
Singapore	0	0	0	0	0	0
South Africa	0	0	0	0	0	0
Taiwan	2,242	2,958	2,741	1,528	4,018	3,758
Thailand	1,600	1,127	1,027	0	0	0
United Arab Emirates	0	0	0	12	91	85
United Kingdom	18,900	26,184	23,554	0	0	0
United States of America	0	0	0	0	0	0
Total	2,126,765	2,842,363	2,609,340	1,983,085	2,389,693	2,116,847

	2010			2011		
	Quantity	Cost including insurance and freight	Value for duty	Quantity	Cost including insurance and freight	Value for duty
Australia	15,347	12,735	11,717	42,409	75,425	60,633
Austria	650	4,433	4,180	0	0	0
Bangladesh	0	0	0	0	0	0
Belgium	0	0	0	0	0	0
China, People's Republic of	45,133	52,692	48,820	102,261	269,564	269,354
Czech Republic	0	0	0	22,175	26,530	22,259
Denmark	0	0	0	0	0	0
Finland	0	0	0	475	1,787	1,613
France	210,336	134,765	109,426	210,000	171,821	144,465
Germany	903,686	784,559	689,743	943,525	1,221,361	1,027,530
Hong Kong (Special Administrative Region)	5,421	12,512	12,053	2,880	8,338	7,642
India	0	0	0	0	0	0
Iran	0	0	0	0	0	0
Israel	0	0	0	47	120	103
Japan	1,394	6,861	6,541	1,242	7,181	6,781
Korea, Republic of	1,126	4,496	4,268	1,248	5,607	5,226
Malaysia	24	68	65	550	1,063	1,022
Mongolia	66,000	59,197	55,334	0	0	0
Netherlands	1,090,673	934,695	836,581	685,525	866,258	777,015
New Zealand	0	0	0	39,749	50,141	44,877
Poland	21,007	16,053	14,314	21,007	46,892	43,093
Singapore	0	0	0	18	40	37
South Africa	0	0	0	0	0	0
Taiwan	820	1,711	1,583	824	1,988	1,853
Thailand	0	0	0	0	0	0
United Arab Emirates	0	0	0	0	0	0
United Kingdom	0	0	0	0	0	0
United States of America	2,501	3,931	3,715	3	331	316
Total	2,364,118	2,028,708	1,798,340	2,073,938	2,754,447	2,413,819

	2012		
	Quantity	Cost including insurance and freight	Value for duty
	Australia	2,171	7,756
Austria	52,500	69,975	61,697
Bangladesh	14,000	18,237	15,934
Belgium	21,000	28,172	25,820
China, People's Republic of	117,303	229,998	225,540
Czech Republic	0	0	0
Denmark	21,000	34,125	31,638
Finland	725	2,534	2,326
France	42,000	55,480	50,038
Germany	1,103,420	1,655,925	1,448,834
Hong Kong (Special Administrative Region)	4,353	22,476	21,579
India	5,000	8,707	7,257
Iran	0	0	0
Israel	30	213	184
Japan	1,199	6,944	6,730
Korea, Republic of	712	3,266	3,056
Malaysia	2,560	9,916	9,454
Mongolia	0	0	0
Netherlands	982,636	1,700,745	1,586,755
New Zealand	5,480	17,240	16,556
Poland	187,500	291,911	271,069
Singapore	18	38	36
South Africa	0	0	0
Taiwan	730	1,428	1,321
Thailand	0	0	0
United Arab Emirates	0	0	0
United Kingdom	1	10	9
United States of America	14	237	220
Total	2,564,352	4,165,333	3,793,463

Table information:
Units:
Cost including insurance and freight: Dollars, Magnitude = Units (in 1s)
Quantity: Number, Magnitude = Units (in 1s)
Value for duty: Dollars, Magnitude = Units (in 1s)
Footnotes:
Year ended June
Quantity unit:
Code 1108130000: Kgms
Data is provisional for the three most recently released months.
Aggregated Harmonised System (HS) codes may include confidential 10 digit codes, in which case the summed data will exclude the confidential value(s).
All dollar values are in New Zealand dollars unless otherwise stated.
For more information, please see www.stats.govt.nz/trade
Status flags are not displayed
Table reference:
TIM001C
Last updated:
Cost including insurance and freight: 25 July 2012 10:45am
Quantity: 25 July 2012 10:45am
Value for duty: 25 July 2012 10:45am
Source: Statistics New Zealand
Contact: Information Centre
Telephone: 0508 525 525
Email:info@stats.govt.nz