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The Pacific Rim Beef Trade: Impacts of Lifting Foot-and-Mouth Disease Trade Barriers

Map of Pacific Rim

By

Allan Rae, Chris Nixon and Peter Gardiner

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Foreword

Developments in Asian food markets will continue to be of considerable relevance to the New Zealand agribusiness sector, despite current economic difficulties in the Region. The beef industry is a case in point, with New Zealand being highly dependent on Pacific Rim markets, and with growth hopes resting to a large extent on Asian markets.

Considerable adjustments could be forced upon these markets as a consequence of parts of South America being recognised as clear of foot-and-mouth disease, thus facilitating their entry to these markets and encouraged by certain reforms negotiated in the Uruguay Round. On top of these developments, the next Round of agricultural negotiations, due to begin by 1999, could bring about further reforms that could change the structure of Pacific Rim beef markets further.

These issues are addressed in this study which was funded by the Agricultural and Marketing Research and Development Trust (AGMARDT), and was conducted jointly by the New Zealand Institute of Economic Research and the Centre for Applied Economics and Policy Studies at Massey University. We gratefully acknowledge the financial assistance of AGMARDT.

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Thanks are also extended to Mrs Julia Fisher who has coped with the task of putting our various drafts into a professional format for publication.

Allan Rae
Chris Nixon
Peter Gardiner

January 1998

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Executive Summary

Foot-and-mouth disease (FMD) can be found in many parts of the world, and is a highly-contagious viral disease that affects all cloven footed animals. The contagious nature of the disease is a main reason for bans placed on beef imports from countries where the disease is endemic. This includes bans imposed by the USA, Japan and South Korea on fresh beef imports from Latin America. Of the countries that have attempted to eradicate foot-and-mouth disease, the most successful have been Uruguay and Argentina.

New Zealand's beef trade is highly dependent on the USA manufacturing beef market. Both Uruguay and Argentina have now been granted access to this market from 1996 and 1997 respectively, involving maximum shipments of 20,000 tonnes (product weight) each. Canada has also recently opened its market in a small way to these two supplier countries. It is probably only a matter of time before Argentina and Uruguay also gain access to the Japanese and Korean beef markets.

A Pacific Rim beef trade model was constructed for the base year of 1995. It represented seven markets - North America, Japan, South Korea, Australia, New Zealand, Argentina and Uruguay. Beef was differentiated into two products, called 'grainfed' and 'grassfed' beef. Substitution in consumption between both types of meat was modelled in North America, Japan and Korea. The trade policies negotiated in the Uruguay Round were incorporated into the model. The model was used to make projections to the year 2001, by which time the Uruguay Round reforms would be fully implemented. To make these projections, various factors that effect demand and supply through time were incorporated. These were income and population growth on the demand side, and productivity growth and feedgrain costs on the supply side.

If South American entry to the Pacific Rim beef market was limited to their existing quotas in North America, our results suggest that impacts on Pacific Rim markets would be minimal. It can be expected, however, that importing countries such as Japan and South Korea will have opened their markets to beef from FMD-free regions of South America probably well before the year 2001. This presents the potential for more substantial impacts on regional markets, and outcomes will depend in part on the size of the Argentinian exportable surplus of frozen or chilled beef. This might be expanded through the diversion of product from use in 'manufactured' beef to fresh uses but even

so, future economic growth in South America will provide expanding market opportunities for countries such as Argentina.

Another potential contributor to growth in Argentina's exportable surplus of beef is productivity growth in its domestic beef production systems. Recent research from Argentina suggests a considerable potential exists to improve productivity over the years ahead. Recognising such a positive rate of beef productivity growth in Argentina had no effect at all on the Northeast Asian market, since Argentina did not export to that region at our initial estimate of Latin American freight costs. The North American trade in grassfed beef was also insensitive to these changes, as was the volume of New Zealand's total beef exports to the modeled countries and the New Zealand domestic price.

Results turned out to be much more sensitive to the level of freight costs from Latin America to Pacific Rim markets. The effects of reducing these by up to 30% were that total imports by Japan and Korea increased little, but market shares changed substantially - from an Australasian share of 86% with the initial freight costs to a share of only 36% should Latin American transport costs fall by 30%. Australasian beef is diverted to the North American market, whose total imports would increase. But only when those freight costs were reduced by 30% was the quantity of Australasian beef to be diverted from Northeast Asia of sufficient volume to fully meet the North American quotas. Reductions in Latin American freight costs also impacted therefore on New Zealand's total exports to the modeled countries, and on the domestic beef price within New Zealand.

North American beef import policies could undergo further change over the medium term. One political development that could produce a change to the allocations would be the integration of the MERCOSUR free trade area with NAFTA. Assuming this would result in duty free South American access to the USA and Canada, exports of 'grassfed' beef from Argentina and Uruguay to North America could reach well over 500,000 tonnes compared with today's quota allocations that allow a maximum of 64,000 tonnes (cwe). This would produce major changes into the Pacific Rim beef markets. The Australasian 'grassfed' industries adjust through diversion of exports from North America to Northeast Asia, and through price-induced supply contraction. Beef prices in New Zealand could be reduced by more than 10% from the level that would had applied had the current tariff rate quotas been maintained.

The other change to North American beef policy that we explored was the replacement of the tariff rate quota system with an equivalent ad valorem tariff - ie that tariff that would result in an unchanged volume of total imports into North America. Our findings were similar to those explained above, but less severe from an Australasian perspective since total North American imports could not expand. Exporters from Australia and New Zealand would suffer a reduction in total exports to North America as well as market share, but the results suggest that South American exports within the Pacific Rim would be confined to North American markets.

Our analyses have attempted to differentiate beef products depending upon whether they derived from grainfed or grassfed animals. This required estimates of the extent to which they are viewed as substitutes in consumption. The estimates used for North America were derived from product classifications that fitted rather well to those adopted in this study. However, further work is required on the degree of substitution in Japan. It is possible that the actual strength of the substitution relationship for our beef aggregates could be somewhat higher than that employed in this study. The implications for our results is that we may have over-estimated the degree of independence of the two beef markets in Japan, and hence over-estimated the impacts of Latin American entry on the grassfed beef market.

Both Australia and Argentina are major producers of grain, and Australia has already begun producing grain-finished beef for the Japanese market, and are expected to increase its share of total exports to that market. This is one way in which the beef sector can to some extent be separated from the implications of South American entry into grassfed beef markets. Our analyses assume that South American beef industries do not adopt grainfeeding . A close watch should be kept on such developments in South America, as adoption of grainfeeding would lessen the impacts on grassfed beef markets of their entry to Pacific Rim markets.

Whether or not South American suppliers would choose to export to Asian markets depends critically on their freight costs to those markets. Under some circumstances, our results show that South American suppliers could win substantial market share in Northeast Asia should their freight costs per tonne be no more than 10%-20% above rates from Australasia. Thus a close monitoring of developments in relative freight costs is important.

There could be considerable future increases in beef output in Argentina due to the adoption of currently available technology. Our analysis indicates that this is a very important issue in determining the extent to which Argentina may be able to penetrate Pacific Rim markets. Should these production increases take place, considerable exportable surpluses are likely to exist and could find their way to Asian markets given competitive freight costs. A close watch should be kept on productivity developments in the beef sectors of South America, and where gains are achieved the New Zealand industry should work to match them in order to remain competitive.

Argentina is likely to become a dependable large-scale supplier of high-quality food products, due to investments (both domestic and foreign) and innovation in its agri-food systems. This is expected to lead to lower production, processing, and marketing and distribution costs, and the improvement of product quality. The New Zealand industry should keep a close watch on these developments and respond accordingly to maintain their desired market positions.

Integration of the North American Free Trade Agreement with the Latin American free trade area called MERCOSUR is already under discussion. Our results indicate that

should this occur, South American suppliers will win a large share of the North American market at the expense of New Zealand and Australian suppliers. Should the New Zealand industry wish to maintain a presence in the US market, then work will be required to gain similar access conditions. One approach would be to push forward the idea for closer relations between New Zealand and NAFTA. Unless something like this occurs, New Zealand is likely to lose important North American markets, and not just those for beef, in the advent of a North American-South American free trade area becoming a reality.

Chapter 1

Introduction

New Zealand's economy and trade is highly dependant on lightly processed agricultural commodities. Not only has market access been difficult, but by definition commodity prices are volatile, inviting large terms of trade shocks. This has resulted in large variations in export returns and continuing structural balance-of-payments problems for New Zealand.

The risks are further increased because of the dependence on individual markets, usually highly protected Northern Hemisphere markets, for the majority of revenue. Slight changes in subsidy regimes, and supply and demand conditions, can have major impacts on New Zealand's balance of payments, and year-to-year rural returns.

Typical of New Zealand's commodity dependence is the beef trade. New Zealand's beef trade is highly dependant on the North American manufacturing beef market. Large quantities of beef are produced and sent in a lightly processed form to be blended with domestic beef and used at the low price end of the market, i.e. hamburger meat. This has suited New Zealand processors and farmers in terms of expertise required to develop markets, to be reliable suppliers or to maintain expensive marketing and R&D programmes. This production push approach with a focus on costs was a very profitable venture in the late 1980s and early 1990s when beef was in high demand.

However, the key characteristic in this market is price; importers are price sensitive and New Zealand exporters have been price takers. This has been demonstrated in recent times as the beef herd in the United States has increased, prices have fallen in the United States and competition in Asia has increased as United States beef exports have increased¹.

While these adverse price conditions may be considered a short term ‘problem’ by producers in New Zealand, other fundamental changes are occurring in the world beef market that will have a significant impact on producers in New Zealand. Some of the events are:

- The United States beef cycle;
- The BSE crisis;
- United States becoming a net exporter;
- EU hormone ban;
- Uruguay and Argentina becoming free of foot-and-mouth disease (FMD).

The most important trade policy issue in world beef markets, according to the World Trade Organisation (WTO), has been sanitary measures. This study has been commissioned by AGMARDT to assess some impacts of the introduction of FMD-free Latin American beef on to Pacific Rim markets in direct competition with New Zealand beef. Up until 1996, not only has beef been sold at a premium compared with many non-Pacific markets, but the South Americans have been excluded from the markets of Northeast Asia and North America. This has been of major benefit to beef growers in New Zealand and Australia.

Using a partial equilibrium model of Pacific Rim beef markets we will analyse how Latin American exports could impact on Pacific Rim beef markets, including North America. A number of scenarios will be developed for alternative policy and economic environments, in order to demonstrate the sensitivity of our results to changes in some key parameters.

Recent trends in major Pacific Rim markets, and in Argentina and Uruguay, are reviewed in Chapter 2. The following Chapter described the computer model we developed and its quantification. Results are presented and discussed in Chapter 5, and the final Chapter summarises our conclusions and indicates some issues for further monitoring and study.

¹ Beef prices have also fallen in Asia as well, since the US has increased supplies to that region. This reflects the importance of the North American market to Pacific Rim beef producers.

FOOT AND MOUTH DISEASE

General Characteristics

FMD can be found in a large part of the globe and is a highly contagious viral disease that affects all cloven footed animals. The symptoms are typically blistering of the mouth, feet and or udder. FMD occurs in seven different forms, with 64 different sub-types making it difficult to vaccinate against, since the clinical signs are for the different forms are practically the same². While the disease can easily be transmitted between domesticated animals, however, it has different impacts on different sorts of animals (see Table 1.1).

Seven different FMD serotypes have been identified: O, A, C, SAT 1, SAT 2, SAT 3, and Asia 1. Different serotypes are found in different locations, i.e. types O, A, and C have covered Latin America, the Middle East and North and South Asia. To complicate matters further, there is also antigenic variation according to sub-type, for example O₁₋₁₁, A₁₋₃₂, and C₁₋₅. This variation means that it is very difficult to protect animals by vaccination, presenting difficulties for those trying to manufacture the right vaccine for the right antigenic variation, since there is no generic vaccine that will protect livestock between different serotypes. Practically, this means a wide range of vaccines have to be available to deal with FMD.

The highly resistant nature of the disease and its ability to spread quickly means that FMD is spread widely across the world. In most countries that have FMD, some sort of programme does exist to halt it progress. However, it is only in Latin America that major changes in FMD status have occurred.

Table 1.1 FMD Characteristics for Different Animals

| | Mortality | Main Transmission Method | Economic Impact on Animals |
|------------------------|--|---|--|
| Cattle | Rare, usually around 5% Greater among calves. | Stock movement, Contaminated people, equipment or vehicles. Infected products. | Increased abortions and still births. Reduced fertility. Loss of milk and liveweight production. |
| Sheep and Goats | Not seriously affected by fmd. | Very few symptoms, therefore may act as a 'disease reservoir'. | Only a slight impact. |
| Pigs | Depression and anorexia and high mortality of piglets. | Pigs are more susceptible and sensitive to airborne transmission. | Can act as amplifiers for the disease. Loss of condition. |
| Other | | Wild animals and birds may act as carriers. Laboratory 'escapes'. | |

² The different forms a disease can take are called serotypes. A serotype is a group of organisms that can be pinpointed by serological methods. When an animal is infected a natural immunity response is provoked against members of that serotype but not against a member of any other serotype.

The contagious nature of FMD is one of the main reasons for bans placed on beef traded from FMD infected countries. Despite this, it does not usually cause mortalities. Some industry observers suggest that FMD bans are spurious, particularly when meat is ‘boned-out and aged’³, since there is little risk of the disease being passed on in this state. This is supported by the evidence that Argentinean beef has been exported in boned out and aged form for 30 years without any outbreak of FMD. However, FMD is considered a serious animal disease because it presents authorities with considerable difficulties to control its effect on trade and impact on animal production.

Transmission of FMD

The susceptibility of cloven-hoofed animals to FMD means that it is highly contagious. Part of the reason for this is the short incubation period, the ability to survive for lengthy periods of time in the environment, multiple ways of transmission, and the large amounts of virus produced once animals are infected.

Ways of disease transmission include:

- Movement of infected livestock. Since symptoms of FMD do not show up immediately, the movement of stock can play an important role in spreading disease. Stock can also act as carriers for as long as several months;
- Infected animal product, particularly the heart, the skin, glands and lymph nodes, all contain high quantities of the FMD virus.
 - Of the meat cuts, de-boning of meat will prevent the spread of infection, since the infection is limited to the bone marrow;
 - Milk, if unpasteurised, can spread FMD;
 - Hides, skins and wool can be infected for several weeks;
 - Semen can carry FMD and constitutes a real risk of transmission;
- Contact with contaminated people. FMD may be spread over short distances by stock workers with contaminated fingernails. The disease rarely affects humans although they can carry FMD for a short period of time;
- Contact with wild animals. Birds, particularly, can act as vectors for the disease;
- Contact with contaminated vehicles or equipment. Farming equipment and feed can carry the virus for long periods of time;
- Airborne transmission. Airborne infection is a major source of transmission. How far the disease can spread from the source of infection can depend upon virus output, dispersion and survival. The quantity of the airborne virus excreted is a function of animal species,

³ Aging is important because it lowers the pH levels. The pH levels are also important for transmission of the virus. At pH levels below 4 and above 11 FMD is inactive.

stage of disease and virus strain. The majority of infections take place within a 10km radius of the source. However, given optimal weather conditions and the right transmission vector (pigs) transmission can be swept as far as 100kms;

- Faulty vaccinations and laboratory accidents.

Chapter 2

Pacific Rim Beef Markets

THE TWO-TIER NATURE OF WORLD BEEF MARKETS

New Zealand beef producers have benefited from the two-tier nature of the world beef market, since these markets have different demand and supply drivers. The major supply countries of the Pacific Rim (excluding South America) are producing beef that is free from foot and mouth disease. The producers of FMD meat have been predominately New Zealand, Australia, United States and Canada while the major consumers with trade bans on FMD-beef have been North America and North Asia. Strenuous efforts are made to maintain the 'zero risk' FMD status and prevent any outbreak of FMD in these countries including through restricting access to Pacific Rim markets to eligible suppliers

The other major producers, predominately in South America, Europe, parts of Asia, the Middle East, and Latin America, have for one reason or another not been able to control and eradicate FMD from their herds. This meat is sold outside of the major Pacific Rim markets, or it is sold in a further-processed form. Most importing countries have restrictions pertaining to how FMD

meat is treated before being allowed into that country. Usual treatments include canning the product, heat treatment, de-boning, and ageing the product.

Another important division in beef markets that has restricted competition in Asian markets has been the Kerin/Andriessen agreement. This prevents export subsidies from being used on European Union (EU) beef sales in many Asian markets. This effectively excludes sales of beef from mainly Ireland and Denmark into Japan, South Korea, Taiwan, Malaysia, Singapore and Papua New Guinea.

Further distinctions in the world beef market can be made within the FMD-free meat trade. Historically New Zealand and Australia have produced grassfed beef. This has been a function of the climatic conditions that exist in these two countries. Moderate climates have allowed cattle to be kept outside all year round with a minimum of feed requirement since hay and silage (in New Zealand) and grains (in Australia) were grown on the same farm. In New Zealand also approximately 50% of the beef slaughter comes from the dairy industry (culled cows). This type of meat has been popular in the manufacturing sector of the North American market. It is significant that it is grassfed beef that will compete directly against South American product in the North American market.

In contrast, North American, Asian and increasingly Australian cattle industries are geared to the feedlot business, where cattle are housed and are grain fed. These animals are specifically bred for the beef trade and have characteristics of smell when cooking and texture which the Japanese market, in particular, demands. Combined with the higher-value beef produced, it means that substantial premiums are made in comparison to commodity-type beef produced for the hamburger market

Impact of the Uruguay Round

The two-tier nature of the global beef market is now becoming less marked as some of the major Latin American producers eradicate FMD. This is a long and involved process that starts with eradication and vaccination, a period of FMD free status (two years), certification by an international agency and finally clearance by individual importing countries.

A crucial milepost in this process occurred with the agreement in the last GATT Round to allow disease or pest free areas within any country or group of countries. This was defined as:

‘An area whether all of a country, part of a country, or all or parts of several countries, as identified by competent authorities, in which a specific pest or disease does not occur’.⁴ (The Final Act, Agreement on SPS p9)

Two concepts underpin this:

⁴ Why did New Zealand support this motion when it could have detrimental impacts on our beef, by making it easier for South American regions to export beef? This has been neatly answered by a recent fruit fly outbreak in Auckland. The risk that parts of New Zealand could be infected by disease/pest is high, therefore, because agricultural exports are important to the economy this type of measure will on balance be positive for agricultural exporters.

- Regionalisation: In effect this allows for disease-free areas to be set up within a country which has an outbreak of a disease or infestation of pests. This is contingent on effective boundary controls, control measures around the boundary, and detection and surveillance around the quarantine area;
- The Sanitary and Phytosanitary Agreement (SPS): This introduces non- discriminatory clauses into the Agreement. Countries are given the right to ban selected goods if they endanger human, animal and plant health, but should not discriminate between sources of supply if similar conditions exist in supplying countries. Any bans should be made on accepted international standards and barriers based on scientific principles.

BEEF MARKETS

This section concentrates on Pacific Rim beef markets, since this is where the majority of New Zealand beef is sold. Table 2.1 shows the major importers and exporters of beef in world markets. The major growth in beef importing markets has been in Northeast Asia while strong export growth has occurred from the Americas, apart from Argentina. The US market accounts for almost 25% of world beef imports⁵, with South Korea and Japan making up another 25% of the world trade.

United States and Canada

Production in North America has increased dramatically as the region has geared up to exploit the Northeast Asian markets as they liberalise. However, most production is used for domestic consumption or the intra-North American trade⁶. Beef production is mainly grainfed, while grassfed (or nonfed) production depends largely upon the dairy herd cull. Canadian and US cattle cycles seem to have peaked⁷, with herd liquidation accelerated by drought and surging grain prices.

Consumption of beef in North America is falling as pork and chicken become even more price competitive. These productivity improvements in other meats mean that beef is becoming more expensive relative to these competing meats. The BSE crisis has also jolted consumer confidence in beef, although this is proving to be a temporary occurrence. Consumption of grassfed beef has been declining, although imported grassfed beef sales, up until 1996, have remained static.

The large growth in supply in the United States and Canada has had a detrimental impact on beef prices around the world. US cattle prices reached an eight-year low in March 1995, with a further 10% drop in the 1996 March year. Since that time prices have dropped further, but had started to make an erratic recovery by March 1997. The OECD (1997) forecasts beef prices in the US to rise by 14% between 1996 and 2000.

⁵ Even more if attention is restricted to markets for grass-fed beef.

⁶ Canada is the second biggest market for United States beef while the United States takes over 90% of exported Canadian beef (WTO,1996).

⁷ The OECD (1997) forecasts production to peak in 1997, then to decline by almost 7% by the year 2000.

Table 2.1 Major Players in the Global Beef Trade

| Major importers | | | | | | Major exporters | | | |
|-----------------|---------------|------|-------|------------|-------|-----------------|---------------|-------|-------|
| Country | 1995 | 1996 | 1997 | 96/95 | 97/96 | Country | 1995 | 1996 | 1997 |
| | ('000 tonnes) | | | (% change) | | | ('000 tonnes) | | |
| USA | 954 | 940 | 1,034 | -1 | 10 | Australia | 1,090 | 1,016 | 1,080 |
| Japan | 940 | 871 | 870 | -7.5 | 0 | EU | 1,006 | 960 | 910 |
| Russia | 420 | 650 | 670 | 6 | 3 | USA | 826 | 849 | 860 |
| EU | 460 | 360 | 380 | -2.5 | 5.5 | New Zealand | 522 | 536 | 568 |
| S.Korea | 197 | 196 | 234 | 1 | 20 | Argentina | 513 | 460 | 480 |
| Canada | 256 | 237 | 200 | -7.5 | -15.5 | Brazil | 210 | 315 | 360 |
| Mexico | | 60 | 93 | 43 | 55 | Canada | 224 | 286 | 296 |
| Brazil | | 100 | 80 | -21.5 | -20 | Uruguay | 143 | 210 | 210 |

Notes: 1. Quantities in carcass weight equivalents.

2. Forecasts for 1997

Source: WTO (1996,1997).

Beef imports into these two markets are predominantly grassfed product from Australia and New Zealand. Limited quantities of grassfed beef are now admitted from Uruguay and Argentina. Grassfed beef is used in the low-value manufacturing trade or hamburger market. Quantitative restrictions under the Meat Import Law (MIL) and a more punitive quota system in Canada have restrained the imports of grassfed beef into North America over the past ten years. Ironically a relaxation of this system through the GATT Uruguay Round negotiations coincided with the dramatic beef price drop in the United States and Canada. Supplying countries such as New Zealand and Australia have found it more profitable to send beef to Asia despite increases in their US quota allocations.

The United States has increased exports of beef rapidly, with the OECD (1997) forecasting beef exports in 1997 at 43% above the 1991-95 average, and for the US to become a net exporter of beef from 1997. Canada has also increased exports dramatically, with 1997 exports forecast at 73% above the 1991-95 average. The main target for North American beef exporters has been North Asia with 55% of all United States exports in 1996 going to Japan (WTO,1996).

Table 2.2 shows some relevant statistics for the bovine meat sectors of the United States and Canada.

Table 2.2 Beef Sector in Canada and United States (1996 estimates and 1997 forecasts)

| | Unit | Canada | | United States | |
|------------------------|-------------|--------|--------|---------------|--------|
| | | 1996 | 1997 | 1996 | 1997 |
| Cattle Numbers | '000 head | 13,186 | 12,767 | 103,819 | 99,000 |
| Beef & Veal Production | '000 tonnes | 990 | 1,053 | 11,800 | 11,446 |
| Consumption | '000 tonnes | 946 | 973 | 11,879 | 11,870 |
| per capita | kgs/capita | 31.8 | 32.4 | 44.7 | 44.3 |
| Imports | '000 tonnes | 237 | 200 | 940 | 1,034 |
| Exports | '000 tonnes | 286 | 296 | 849 | 860 |
| Cattle Imports | '000 head | 41 | 38 | 2,100 | 1,908 |
| Cattle Exports | '000 head | 1,279 | 900 | 86 | 272 |

Source: WTO (1997)

Northeast Asia

The two largest import markets in Northeast Asia are Japan and South Korea (see Table 2.3). Japanese beef production has stabilised, although compositional changes within the beef herd have meant that more frozen beef has been imported. The switch from dairy cattle beef which competes directly with imports to higher value native Wagyu breeds is the reason for the increased import demand for frozen beef for processing. In Korea, production has been growing strongly (up 72% between 1989 and 1995) although self-sufficiency has been falling, with prices relatively buoyant as consumer demand remained strong until the economic crisis of late-1997.

Per head consumption of beef is relatively low in both Korea and Japan, so there is scope for further increased demand as consumers continue the trend away from cereals and towards meat in their diets⁸. Continued substitution from white meats to beef as prices for imported beef drop and domestic markets are partially liberalised is contributing to the strong beef demand, although some slowdown can be expected given current economic conditions in the region.

In Japan imports have been mainly sourced from the United States and Australia with the former country gaining market share. Canada and New Zealand are smaller players in that market. The Korean imported beef market is dominated by Australia, New Zealand and the United States. Compared with Japan, New Zealand has a bigger share of the Korean market because of this market's preference for grassfed beef.

Table 2.3 Beef Sector in Japan and Korea

| | Unit | Japan | | Korea | |
|------------------------|-------------|-------|-------|-------|-------|
| | | 1995 | 1996 | 1995 | 1996 |
| Cattle Numbers | '000 head | 1,505 | 1,389 | 2,594 | 2,635 |
| Beef & Veal Production | '000 tonnes | 601 | 555 | 155 | 174 |
| Consumption | '000 tonnes | 1,519 | 1,441 | 301 | 323 |
| per capita | kgs/capita | 12.1 | 11.5 | 6.7 | 7.1 |
| Imports | '000 tonnes | 942 | 871 | 168 | 162 |

Notes: 1. 1996 estimate for Japan
2. Korean data are in product weight.

Source: WTO (1997) for Japan and NLCF (1996, 1997) for Korea.

Australia and New Zealand

Production in Australia and New Zealand has declined recently because of droughts, appreciating currencies, high feed costs and depressed international prices. Droughts in Australia have disrupted cattle production, while low prices and a sharply appreciating dollar in New Zealand have contributed to declining beef numbers. The composition of the two beef herds is also different. The Australian beef herd is changing from a grassfed to a grainfed herd reflecting the increased focus on Asian markets; ABARE (1995) forecasts imply that the share of grainfed beef in Australia's exports to Japan will increase from 40% in 1994 to 58% by 2000. The New Zealand beef herd is also changing as increasing numbers of dairy cattle, driven by high dairy prices, have offset the decreasing production of beef-only cattle.

The exports of the two regions reflect the composition of their respective beef herds. Australian exporters, due to backward integration from Japanese trading houses, has focused on North Asia. This is reflected in the marked increase in production and export of grainfed beef product and the decreasing share in exports of grassfed beef. The New Zealand beef herd, which is predominantly

⁸ This phenomenon is observed in many rapidly industrialising countries, due in large part to increased incomes and urbanisation of the population (Rae, 1995 and 1998).

grassfed, concentrates on the United States hamburger market and Korean import tenders, and is increasingly supplied from culled dairy cows.

Table 2.4 shows the relative size of the New Zealand and Australian beef industries.

Table 2.4 Beef Sector in New Zealand and Australia (1996 estimates and 1997 forecasts)

| | Unit | New Zealand | | Australia | |
|------------------------|-------------|-------------|------|-----------|-------|
| | | 1996 | 1997 | 1996 | 1997 |
| Cattle Numbers | million | 9.2 | 9.1 | 26.5 | 26.8 |
| Beef & Veal Production | '000 tonnes | 647 | 683 | 1,638 | 1,700 |
| Consumption | '000 tonnes | 121 | 128 | 613 | 617 |
| per capita | kgs/capita | 32.7 | 34.0 | 33.6 | 33.5 |
| Exports | '000 tonnes | 536 | 568 | 1,016 | 1,080 |

Source: WTO (1997)

THE CURRENT SITUATION IN URUGUAY AND ARGENTINA

Of the countries that have attempted to eradicate foot-and-mouth disease, the most successful have been Uruguay and certain regions in Argentina. The ability of these countries to compete head to head with New Zealand in its most important markets means that these countries will be the focus of our investigation⁹.

For the first time since 1928, Argentina was able to export fresh (ie uncooked) beef to the USA in 1997. Uruguay benefited from the same measure in the previous year, and in each case a quota of 20,000 tonnes (product weight) had been allocated. Argentina was also granted access to the Canadian market in 1997 as was Uruguay the year earlier. These quantities are relatively small and, unless either country can export to North America at the out-of-quota tariff¹⁰, the impacts on Pacific Rim markets may not be significant. However, it is possible that Japan and Korea could also allow South American access to their beef markets, in which case the implications for existing players could be more significant. This will depend, inter alia, on the volume of beef that Argentina and Uruguay might divert from other markets - their fresh beef sales to the EU often provide more lucrative returns than those available from Northeast Asia, and domestic demand in South American markets also is showing growth.

Uruguay

Since drought reduced the size of the Uruguayan cattle herd in 1989, cattle numbers and beef production have been on the increase. Total cattle numbers are expected to be approximately 11 million head in 1997 and may continue to expand, fuelled by the bright export prospects (Table

⁹ Parts of this section are based on personal communications from the New Zealand Meat Producers' Board.

¹⁰ This tariff was set at 30.3% for 1995, declining to 26.4% in 2001.

2.5). Exports showed a substantial increase from 1995 to 1996; exports to the US totalled 24,000 tonnes (product weight) in 1996, up by more than 22,000 tonnes from the previous year due to the USA's FMD-free notification. Uruguay also exported some 25,000 tonnes of chilled and frozen beef to the EU in 1996.

Table 2.5 The Bovine Meat Sector in Uruguay (1996 estimates and 1997 forecasts)

| | Unit | 1995 | 1996 | 1997 | 1995/6 (% change) | 1996/7 (% change) |
|------------------------|-------------|--------|--------|--------|-------------------------|-------------------------|
| Cattle Numbers | '000 head | 10,451 | 10,630 | 10,790 | 2 | 1.5 |
| Beef & Veal Production | '000 tonnes | 350 | 419 | 423 | 16 | 1 |
| Consumption | '000 tonnes | 204 | 205 | 213 | 0.5 | 4 |
| per capita | kgs/capita | 65 | 65 | 67 | 0 | 3 |
| Exports | '000 tonnes | 143 | 210 | 210 | 32 | 0 |

Source: WTO (1997)

Of concern to other Pacific Rim beef producers is not so much current levels of production, but the potential response of Uruguayan producers and consumers. On the production side, attractive export prospects could see a continuation of the shift of resources into the beef sector and more land will be made available for production, increasing exports further. On the consumption side, higher beef prices (because of increased export returns) will dampen consumer demand, causing consumers to substitute other meats for beef¹¹. This will free up further supplies of beef for export.

Argentina

The beef industry in Argentina must be considered a potential threat to grassfed producers such as New Zealand because of:

- The relative size of the Argentine beef industry, which produces approximately 2.5 million tonnes of beef while 400,000 and 600,000 tonnes are produced by Uruguay and New Zealand respectively;
- The demonstration effects of other provinces and nearby countries achieving FMD- free status; and
- The lower cost of production both for land and labour and the ability to increase supply.

In 1996, the Argentine cattle herd was the smallest since 1971 due to drought and higher returns from competing farm enterprises (see Table 2.6). According to the OECD, cattle numbers are forecast to increase by about 1% annually to 57 million head by 2001 as producers take advantage of improved export prospects, and beef production could reach over 3 million tonnes by that year.

¹¹ Uruguayans, on a per head basis, are the number one consumers of meat in the world.

The EU is Argentina's major export market, taking over 105,000 tonnes in 1996; Argentina has a quota of 28,000 tonnes of high-quality beef cuts in this market. Export prices for Argentine beef have been weaker following the BSE crisis in Europe. Much of the recent increase in beef exports from Argentina was accounted for by sales within South America.

Table 2.6 The Bovine Meat Sector in Argentina (1996 estimates and 1997 forecasts)

| | Unit | 1995 | 1996 | 1997 | 1995/6 (% change) | 1996/7 (% change) |
|------------------------|-------------|--------|--------|--------|-------------------------|-------------------------|
| Cattle Numbers | '000 head | 54,207 | 53,569 | 51,821 | -1 | -3.5 |
| Beef & Veal Production | '000 tonnes | 2,600 | 2,550 | 2,500 | -2 | -2 |
| Consumption | '000 tonnes | 2,080 | 2,110 | 2,020 | 1.5 | -4.5 |
| per capita | kgs/capita | 60.7 | 60.9 | 57.6 | 0.5 | -5.5 |
| Exports | '000 tonnes | 520 | 460 | 480 | -11.5 | 4.5 |

Source: WTO (1997)

Why is Latin American beef such a competitive threat to the New Zealand industry? It is the size of its industry and the comparative advantage that South American beef producers have over competitors that suggests its competitive ability. More crucially it is the type of beef that is produced. It is grassfed, it is produced more cheaply and they are closer to the North American market than New Zealand producers. Also, some end-users believe that South American beef is better in quality, consistency of service, and supply (Grant, 1996).

The beef industry has played a major role in the Argentinean economy for nearly two centuries. Despite a catalogue of adverse trade policy disasters (including the Commonwealth Preference System that excluded Argentinean beef from the lucrative British market) they have developed a whole raft of value-added products that account for over 90% of beef exports.

Its success, according to Jaffee et al (1993), over the past twenty years:

“... lies not in especially favorable trends in production, trade, or enterprise profitability, but in its ability to survive and maintain international competitiveness in a situation of rampant inflation, higher interest rates, currency overvaluation, and overall macroeconomic uncertainty, heavy direct and indirect taxation against producers, processors, and traders, increased competition for resources from Argentine cereals sub-sector, and growing subsidies and protection among its competitors or traditional markets.”

Besides being the lowest cost producer of beef, Jaffee identifies some important industry characteristics that have contributed to beef's survival in Argentina:

- A well developed and flexible stock marketing system providing payment options and fast payments in an inflation ridden economy;
- Innovations in domestic beef distribution;

- Development of new international market outlets; and
- Debt rescheduling by official banks.

Despite the obstacles put in the way of the beef industry, it has found innovative ways to survive. Uncertain market and policy environments have focused attention on signals which clear markets efficiently and quickly. Producers, processors and traders have still been able to find a way to organise a marketing system. The question remains as to how the Argentinean beef industry will react to a more favourable international environment.

Chapter 3

The Spatial Equilibrium Model

THE DEFINITION OF 'EQUILIBRIUM'

A mathematical spatial equilibrium model was constructed to determine the levels of beef production, consumption, trade and prices within the Pacific Rim market. Solutions derived from such a model are equilibria in the sense that they

- specify a set of national prices that determine the levels of production and consumption in each country or region;
- require each country's production to be equal to its exports plus that portion of its production that is consumed domestically;
- require each country's consumption to be equal to its imports plus that portion of its production that is consumed domestically;
- require that if trade occurs between two countries, the price in the exporter nation will equal that in the importer less the relevant transport costs, tariff charges and quota rents; and
- require that if no trade exists between two countries, then the price in the importer nation must be less than that in the exporter plus the relevant transport costs and tariff charges.

REGIONS AND PRODUCTS

The model represented seven Pacific Rim beef markets:

North America (USA and Canada)

Japan

South Korea

Australia

New Zealand

Argentina and

Uruguay.

Argentina and Uruguay were added for those scenarios where Latin American access to Pacific Rim markets was to be analysed. In these cases, additional export demand functions were specified, one each for Argentina and Uruguay, to represent export opportunities for those countries outside of the Pacific Rim market. This was necessary since whether Latin American exports occur to Pacific Rim markets will be influenced by the returns those exports could receive in the alternative markets.

Beef was modelled as two differentiated products, which we call ‘grainfed’ and ‘grassfed’ beef. This was considered more realistic than treating all beef in the Asia/Pacific market as homogenous, but of course is still an approximation to the reality - for example we assume Japanese Wagyu beef is identical to ‘grainfed’ imports which many would claim it is not. Table 3.1 indicates the types of beef that are produced, consumed and traded in each modelled country. For example, both ‘grainfed’ and ‘grassfed’ beef are produced in the USA, but we assume all their exports are ‘grainfed’ and all imports are ‘grassfed’ beef.

Table 3.1 Beef Differentiation Across Countries

| Country | Production | Consumption | Exports | Imports |
|---------------------|------------|-------------|---------|---------|
| USA & Canada | both | both | gn | gs |
| Japan & Korea | gn | both | .. | both |
| Australia | both | gs | both | .. |
| New Zealand | gs | gs | gs | .. |
| Argentina & Uruguay | gs | gs | gs | .. |

Note: gn = ‘grainfed’ beef
gs = ‘grassfed’ beef

Not all countries are defined as both exporters and importers of beef. The trade flows permitted in the model are, for ‘grainfed’ beef, those from North America to Japan and Korea, and that from Australia to Japan. ‘Grassfed’ beef trade flows modelled are those from Australia and New Zealand to North America, Japan and Korea and, in the relevant scenarios, from Argentina and Uruguay to North America, Japan, Korea and other non-Pacific destinations.

BASE PERIOD QUANTITIES AND PRICES

The model was initially constructed to simulate prices, quantities and trade flows in the base period of 1995. All ensuing scenario analyses involve projections to the year 2001, when the GATT/WTO Agreement on Agriculture is to be implemented.

Data on beef production, consumption, trade and stocks were taken from national sources (see Appendix 1) and from the WTO (1996, 1997) and were converted, where necessary, to a carcass weight equivalent (cwe) basis¹². These data then required adjustment for a number of reasons -

¹²A conversion factor of 0.7 was used in all instances.

inconsistencies between national and WTO data, the required absence of stocks in our model, and the ‘netting out’ of exports to and imports from countries not included in our model. The adjusted base data are given in Tables 3.2 and 3.3. Note that the model aggregates Canada and the USA into a single region, with total 1995 exports and imports that are net of the trade flows between these two countries.

Table 3.2 Base Data for 1995 (‘000 tonnes cwe)

| | Production | Consumption | Exports | Imports |
|-------------|-------------------|--------------------|----------------|----------------|
| USA | 11,462 | 11,563 | 736 | 837 |
| Canada | 967 | 951 | 262 | 246 |
| Japan | 601 | 1,582 | 0 | 980 |
| Korea | 155 | 416 | 0 | 261 |
| Australia | 1,468 | 556 | 911 | 0 |
| New Zealand | 533 | 118 | 415 | 0 |

Notes: 1. Production is net of exports to non-model countries
2. Consumption is net of imports from non-model countries
3. Exports are those only to the modelled countries
4. Imports are those only from the modelled countries

Table 3.3 Structure of Beef Trade in 1995 (‘000 tonnes cwe, fresh, chilled or frozen)

| To From | USA | Canada | Japan | Korea | Other | Total exports | Total excl. ‘other’ |
|---------------------|------------|---------------|--------------|--------------|--------------|--------------------------|--------------------------------|
| USA | | 137 | 469 | 130 | 95 | 831 | 736 |
| Canada | 250 | | 9 | 3 | | 262 | 262 |
| Australia | 316 | 47 | 462 | 86 | 152 | 1,063 | 911 |
| NZ | 271 | 62 | 40 | 42 | 102 | 517 | 415 |
| Other | 72 | 2 | | | | | |
| Total imports | 909 | 248 | 980 | 261 | | | |
| Total excl. ‘other’ | 837 | 246 | 980 | 261 | | | |

Beef exports from Argentina and Uruguay include substantial quantities of ‘cooked’ or manufactured beef products, and in some scenarios we wish to examine the implications of some of this beef being diverted to the chilled/frozen beef Pacific Rim trade. Their exports also include sales to the European Union (EU) which provide returns above those that might be expected from Pacific Rim markets, so this beef would presumably not be diverted to the latter markets. Relevant data is found in Table 3.4.

Table 3.4 Base Data for Latin America: 1995 ('000 tonnes cwe)

| | Exports (chilled/frozen) | | Manufactured exports | Total exports | Total consumption |
|-----------|--------------------------|-----------|----------------------|---------------|-------------------|
| | To EU | To others | | | |
| Argentina | 92 | 179 | 245 | 516 | 1,937 |
| Uruguay | 22 | 98 | 22 | 142 | 204 |

In some countries, the production or consumption data required disaggregation to 'grassfed' and 'grainfed' beef. For USA production, the data presented by Brester and Wohlgenant (1991) along with the assumption that all beef imported into the US is 'grassfed' and all that exported is 'grainfed', implied that 65% of total US beef production was classified as 'grainfed'. The same proportion was applied in the case of Canada. It was assumed that 15% of Australian beef production was 'grainfed' in 1995, based on an estimate of Australian grainfed exports to Japan¹³. The consumption data for North America, Japan and Korea was disaggregated into the two types of beef given the definitions of the types of beef produced by and imported into those countries.

Actual beef international freight costs could be obtained only for Australian and New Zealand shipments to Japan, Korea and the USA (East and West coasts). From this information the relationship between cost per tonne and distance was estimated, and then used to estimate freight costs for all other routes. The results are given in Table 3.5.

Table 3.5 Estimated Beef Freight Costs per tonne (indices: New Zealand to North America=100)

| To From | North America | Japan | Korea |
|---------------|---------------|-------|-------|
| North America | .. | 100 | 102 |
| Aust. & NZ | 100 | 87 | 89 |
| Argentina | 100 | 137 | 139 |
| Uruguay | 97 | 144 | 147 |

Beef border prices were estimated from national trade data as unit values (cif or fob), and converted to US\$ at 1995 exchange rates. These unit values required some adjustment, since the base model requires differences between prices to be consistent with freight costs. This resulted (excluding Argentina and Uruguay) in a range in border prices for 'grainfed' beef across countries of US\$2465 to \$2735 per tonne (cwe), and of \$1500 to \$1770 for 'grassfed' beef. Domestic prices of both types of beef in Japan and Korea, and for 'grassfed' beef in North America, were set equal to the border price plus tariffs. Otherwise, domestic prices and border

¹³Personal communication, Australian Meat and Livestock Commission

prices were identical. Beef prices in Argentina and Uruguay will be discussed in later sections, as the appropriate scenario is introduced.

THE DOMESTIC DEMAND AND SUPPLY RELATIONSHIPS

The model included demand and supply relationships that estimated changes in each country's consumption, production and therefore imports or exports, for any given set of price changes. These relationships were specified for both 'grainfed' and 'grassfed' beef as appropriate.

Beef production was assumed to be influenced by the price of beef, the price of maize (for 'grainfed' beef production only) and productivity changes. Maize prices were included since changes in feedgrain costs could affect the relative competitiveness of 'grainfed' and 'grassfed' supplies. As well as base data on production and prices, estimates were also required of the responsiveness (i.e. elasticity) of beef production to changes in beef and grain prices, and productivity enhancement. The elasticity data were taken from Sullivan (1992). In the cases of North America and Australia, where both beef types are produced, lack of data required the assumption of identical supply elasticities for 'grainfed' and 'grassfed' production. FAO data on beef production and slaughterings over the period 1985-95 were used to estimate the average annual growth in production per head, and we assumed that a similar rate of growth will continue over our projection period. These various data are given in Table 3.6. Note that while productivity growth has been negative over recent times in Argentina and Uruguay (according to the FAO data), following analyses set this parameter to zero¹⁴.

Table 3.6 Parameter Estimates for Supply Relationships

| | Supply elasticity with respect to | | Productivity growth (% per year) |
|---------------|-----------------------------------|------------|-------------------------------------|
| | beef price | corn price | |
| North America | 0.6 | -0.05 | 1.49 |
| Japan | 0.4 | -0.01 | 0.99 |
| Korea | 0.5 | -0.13 | 2.84 |
| Australia | 0.7 | .. | 1.77 |
| New Zealand | 0.45 | .. | 0.80 |
| Argentina | 0.5 | .. | -1.53 |
| Uruguay | 0.45 | .. | -0.95 |

Note: North American elasticities are those for the USA. See text for data sources.

Changes in beef consumption were modelled as influenced by changes in beef prices, incomes per capita and growth in the total population. For those countries where both 'grainfed' and 'grassfed' beef are consumed (i.e. North America, Japan and Korea) demand relationships were

¹⁴ Subsequent scenarios will build on other sources to study implications of possible Argentinian beef productivity growth.

specified for each beef type. In these situations, consumption of either type of beef could be influenced by changes in the prices of both 'grainfed' and 'grassfed' beef. We consider this an improvement over other attempts to model the Asia/Pacific beef market (e.g. Huff, 1995) as it allows, for example, the entry of 'grassfed' supplies from Latin America to influence primarily the price of 'grassfed' beef, but also the potential substitution of 'grassfed' for 'grainfed' beef in consumption. Thus the markets for 'grainfed' and 'grassfed' beef are separately specified but are also interrelated.

Estimates of the elasticity of beef consumption to price and income changes were taken from Brester and Wohlgenant (1991) for the USA, from Hayes et al (1990) for Japan, from Doyle et al (1995) for Korea¹⁵, and from Sullivan (1992) for remaining countries.

The Brester and Wohlgenant study was based on improved estimates of 'ground' and 'table-cut' beef consumption in the USA¹⁶, and we assume that their definition of ground beef is identical to ours of grassfed beef. The Japanese results of Doyle et al were estimated for Wagyu beef and 'import quality' beef, the latter defined as either Japanese dairy beef or imported beef. The implications of using their estimates in our study are assumptions that consumers see Wagyu beef as identical to imported grainfed beef, while imported grassfed beef is seen to be identical to 'import quality' beef as defined above. While this is likely to be unsatisfactory, improved estimates were unavailable. Note, however, that the cross-elasticities from the Japanese study are within the 0.1 to 0.4 range of the USA cross-elasticities.

The USA estimates were assumed to apply to North America (ie including Canada) while the cross-elasticities for Japan were also assumed to apply in Korea. The Japanese income elasticities of Hayes et al were specified in terms of changes in meat (rather than total) expenditures, so were replaced by the estimate found in Rae (1995) which was assumed to apply to both types of beef¹⁷. All elasticity data are presented in Table 3.7.

Projections of the demand for beef required projections of future population and income growth in each country. Future growth rates of GDP were based on the projections of the OECD (1997) for the USA, Canada, Australia, Japan and Korea, on IMF data for Argentina and Uruguay, and on NZIER (1997) projections for New Zealand. Population projections were based on past growth rates from national data for Argentina and Uruguay, and from the same sources as above for remaining countries. Resulting assumptions are given in Table 3.8.

¹⁵Doyle et al quote Korean elasticities for 'beef' as a homogeneous product. Their data are applied here to both 'grassfed' and 'grainfed' beef.

¹⁶Their data indicate that over the late 1980's, 40% of beef consumed in the USA was classified as 'ground' beef. This was based on estimated fixed proportions of ground beef produced from various classes of animal, and that included the assumption that 80% of beef imports were of this type. Note that our study makes the assumption that 100% of beef imported into North America is classified as 'grassfed'.

¹⁷Hayes et al found that the income elasticities for both types were beef, with respect to total expenditures on meat, were almost identical

Table 3.7 Elasticity Estimates for Demand Relationships

| Beef type | | Demand elasticity with respect to | | |
|---------------|----|-----------------------------------|------------------|--------|
| | | 'grainfed' price | 'grassfed' price | income |
| North America | gn | -0.81 | 0.14 | 0.81 |
| | gs | 0.41 | -1.02 | -0.20 |
| Japan | gn | -1.79 | 0.28 | 0.8 |
| | gs | 0.25 | -0.37 | 0.8 |
| Korea | gn | -0.69 | 0.25 | 1.09 |
| | gs | 0.25 | -0.69 | 1.09 |
| Australia | gs | .. | -0.78 | 0.18 |
| New Zealand | gs | .. | -0.65 | 0.14 |
| Argentina | gs | .. | -0.59 | 0.27 |
| Uruguay | gs | .. | -0.62 | 0.54 |

Note: See text for data sources.

Table 3.8 Income and Population Growth Rates for Demand Projections (% per year)

| | GDP | Population |
|---------------|-----|------------|
| North America | 2.8 | 0.90 |
| Japan | 2.5 | 0.33 |
| Korea | 6.0 | 0.76 |
| Australia | 2.8 | 1.05 |
| New Zealand | 2.8 | 0.73 |
| Argentina | 5.5 | 1.30 |
| Uruguay | 3.8 | 0.60 |

The type of mathematical model employed in this study required the demand and supply relationships to be linear. These relationships were initially calibrated so that they simulated the 1995 data and exhibited the correct elasticities. The demand relationships were determined for the projection year of 2001 by first projecting 1995 consumption given data on population and income growth and income elasticities, and then recalibrating the relationships so that they predicted that projected level of consumption at base period prices. For the supply relationships, the 2001 production projections were made by first applying the productivity growth rates and then recalibrating the functions so that they predicted the correct supplies at base period prices, and were then further adjusted in a way consistent with the assumed elasticities with respect to corn prices to reflect a projected 22% increase in corn prices¹⁸.

¹⁸The OECD (1997) projects a US export price of US\$133 per tonne fob for the 1997-99 period, compared with an actual average price of \$109 per tonne for the 1991-93 period.

TRADE POLICIES

Whether specified for the base year of 1995 or for projections in the year 2001, the model replicated the trade policies as set out in the Uruguay Round Agreement on Agriculture. These are as follows.

In Japan, no quotas apply and tariff rates are 49.4% in 1995 reducing to 38.5% in 2001.

Import quotas and other impediments to Korean imports have increased their domestic beef prices well above international prices. Doyle et al (1995) estimate the tariff equivalent of these non-tariff trade barriers as 89.7% in 1995. By the year 2001, Korea must remove its quantitative restrictions on beef imports and can apply a tariff of 40%.

Canada and the USA have a system of tariff rate quotas. Quotas have been allocated, at least in part, to specific countries, as set out in Table 3.9. Within-quota tariffs are US\$44 per tonne (product weight) for the USA, and zero for Canada. Over-quota tariffs in each country were 30.3% in 1995, reducing to 26.4% in the year 2001.

Table 3.9 US and Canadian Beef Quotas ('000 tonnes product weight)

| Allocated to: | USA | Canada |
|-----------------------|------------|---------------|
| Australia | 378.2 | 42.0 |
| New Zealand | 213.4 | 29.6 |
| Argentina | 20 | |
| Uruguay | 20 | |
| Open to all suppliers | | 4.8 |

Note: These were converted to a cwe basis in the model, dividing by a conversion factor of 0.7.

Chapter 4

Latin American Access To Pacific Rim Beef Markets: Scenario Analyses

THE SCENARIOS

The Pacific Rim beef trade model described in the previous Chapter includes parameters on elasticities, transport costs, supply productivities and trade policies. Values for all these parameters have been described, and in the present Chapter the corresponding equilibrium trade solutions will be presented and discussed. But it may be of interest to examine the sensitivity of these solutions to changes in some of the model's parameters, for example those which seem especially uncertain or crucial to our analysis. Beef trade policy beyond the period covered by the Uruguay Round Agreement is uncertain, we are unsure of our estimates of beef freight costs from South America and recent events in Korea suggest that bullish past estimates of that country's future growth are most unlikely. Thus it will be informative to present results for a range of scenarios, and those used by us are outlined in Table 4.1.

Table 4.1 The Scenarios for Trade Analyses

| Scenario | North American policy | South American access to NE-Asia? | Diversion of South American cooked beef? | Argentina productivity growth (%/year) | Korean GDP growth (%/year) | South American freight costs |
|----------|------------------------------|-----------------------------------|--|--|----------------------------|------------------------------|
| 1 | WTO | No | No | 0 | 6 | fixed |
| 2 | WTO | Yes | No | 0 | 6 | fixed |
| 3 | WTO | Yes | Yes | 0 | 6 | fixed |
| 4 | WTO | Yes | No | 0 | 6 | vary |
| 5 | WTO | Yes | Yes | 0 | 6 | vary |
| 6 | WTO | Yes | Yes | 0 | 3 | vary |
| 7 | WTO | Yes | Yes | 4.75 | 3 | vary |
| 8 | NAFTA/MERCOSUR free trade | Yes | Yes | 4.75 | 3 | vary |

| | | | | | | |
|---|---------------|-----|-----|------|---|------|
| 9 | Remove quotas | Yes | Yes | 4.75 | 3 | vary |
|---|---------------|-----|-----|------|---|------|

The parameter settings used in the first two scenarios are as described in the previous Chapter, the only difference being that in the second scenario, South American access to Northeast Asian beef markets is permitted. Similar parameters are also employed in the third scenario, but now some of the ‘manufactured’ beef exported from South America is assumed to be available for export to the Pacific Rim in frozen or chilled form. The sensitivity of our results to possible reductions in South American freight costs are explored in scenarios 4 and 5; these are similar in other respects to the third and fourth scenarios respectively.

Scenario #6 includes a 50% reduction in our assumed rate of future economic growth in South Korea, but otherwise is the same as the fifth scenario. Scenario #7 is similar to the sixth, except that productivity growth in the Argentinian beef industry is allowed. The remaining two scenarios may be compared with scenario #7, since they are identical except for their representation of North American beef trade policy. The integration of MERCOSUR with NAFTA is simulated in scenario #8, giving Argentina and Uruguay duty-free access to North American markets. The final scenario looks at the possible trade implications of the removal of the North American tariff rate quota systems, and their replacement with an equivalent tariff. Note that all volumes are measured in carcass weight equivalents.

SCENARIO #1: SOME BASE PROJECTIONS

These projections incorporate the GDP and population growth rates, the rates of growth in beef productivity, and the increase in the world corn price, as discussed earlier. In addition, they incorporate the trade policy reforms agreed to be implemented by the year 2001, including access for Argentina and Uruguay to the North American market (see earlier discussion). South American access to Northeast Asia is not allowed in this scenario. Projections of production, consumption and aggregate imports and exports are given in Table 4.2, trade flow data (aggregated over “grainfed” and “grassfed” beef) are found in Table 4.3 and the price projections are in Table 4.4.

Beef consumption in North America is projected to increase by 9%, despite the projected 7% increase in “grainfed” beef prices. The income elasticities employed ensure that per person consumption of “grainfed” supplies increases, but that of “grassfed” beef decreases, with increases in incomes. The price of ‘grassfed’ beef is projected to decline by about 1% compared with 1995. Production in North America is projected to rise¹⁹ by 10%, and that of “grainfed” beef at a faster rate than for “grassfed” beef, encouraged by the increase in the ‘grainfed’ price and modest productivity growth. While imports are projected to show some growth, exports from North America may increase by 40% due to strong growth in demand in Northeast Asia and the improved access to those markets by the end of the projection period. For Australia, Argentina and Uruguay, their quotas are restrictive in the 2001 projection, but the price differences between those countries and North America were insufficient to attract additional exports at the out-of-

¹⁹ Our analyses recognise longer-term trends in productivity but do not attempt to replicate the USA beef cycle, which may be in a down-swing over the period covered by the projection.

quota tariff of 26.4%. New Zealand did not export to the extent of its quota to the North American market.

Table 4.2 Base Scenario Projections (all quantities in '000MT cwe)

| | 1995 | 2001 | % change |
|----------------------|--------|--------|----------|
| <i>North America</i> | | | |
| production | 12,426 | 13,746 | 10.6 |
| consumption | 12,512 | 13,606 | 8.8 |
| imports | 697 | 730 | 5.2 |
| exports | 612 | 870 | 42.2 |
| <i>Japan</i> | | | |
| production | 601 | 632 | 5.2 |
| consumption | 1,582 | 1,800 | 13.8 |
| imports | 982 | 1,168 | 18.9 |
| <i>Korea</i> | | | |
| production | 155 | 162 | 4.5 |
| consumption | 416 | 646 | 55.3 |
| imports | 261 | 484 | 85.4 |
| <i>Australia</i> | | | |
| production | 1,468 | 1,626 | 10.7 |
| consumption | 556 | 608 | 9.5 |
| exports | 913 | 1,018 | 11.3 |
| <i>New Zealand</i> | | | |
| production | 533 | 556 | 4.3 |
| consumption | 118 | 126 | 6.8 |
| exports | 415 | 430 | 3.6 |

Note: This base scenario includes exports of 35,000 tonnes (cwe) from Uruguay and 29,000 tonnes (cwe) from Argentina to North America in 2001.

Table 4.3 Pacific Rim Beef Flows ('000 MT cwe)

| From | To | North America | | Japan | | Korea | |
|---------------|-----|---------------|------|-------|------|-------|------|
| | | 1995 | 2001 | 1995 | 2001 | 1995 | 2001 |
| North America | .. | .. | .. | 479 | 588 | 133 | 281 |
| Australasia | 697 | 664 | 664 | 344 | 580 | 128 | 203 |
| Latin America | 0 | 64 | 64 | 0 | 0 | 0 | 0 |

Beef production in Japan is projected to grow by 5% between 1995 and 2001, outpaced by the 14% increase in consumption. Income growth was assumed to have a relatively strong impact on the demand for both ‘grainfed’ and ‘grassfed’ beef in Japan, and consumption will be further encouraged due to price reductions as Japan’s tariff reduced from 49.4% to 38.5% over the projection period. ‘Grassfed’ beef prices are projected to decline proportionately more than those of ‘grainfed’ beef since consumption of “grassfed” beef increases proportionately more than that of “grainfed” beef, and prices of the former product were assumed to be much more sensitive to changes in supply than were those of ‘grainfed’ beef. As a result Japan’s beef imports could increase by almost 20%, with substantially increased supplies from both North America and Australasia.

While beef production in Korea is projected to increase by less than 5% over the 1995-2001 period, consumption of beef should increase substantially. The assumed strong economic growth (but see a scenarios #6 to #9) will have a considerable impact on per capita beef consumption, and domestic prices will fall by around 25% by 2001 due to replacement of the import quota system with tariff-only protection of 40% in that year. Consequently, growth in import volumes is projected to be 85%, supplied by increased shipments from both North America and Australasia.

In Australia and New Zealand, beef production is projected to increase by 10% and 4% respectively due to productivity improvements, as prices of ‘grassfed’ beef are projected to decline slightly in both countries. Consumption growth is 10% in Australia and somewhat less in New Zealand, and exports expand by 10% in Australia and 7% in New Zealand. Given the entry of the two Latin American suppliers to the North American market, Australasian export growth is directed at the Northeast Asian markets. Note that ‘grainfed’ exports as a proportion of total Australian exports have been restricted to the 1995 proportion (about 18%).

Table 4.4 Projected Changes in Domestic Prices: 1995 to 2001 (%)

| | No Latin American access | | Latin American access | |
|---------------|--------------------------|------------|-----------------------|------------|
| | “grainfed” | “grassfed” | “grainfed” | “grassfed” |
| North America | +7.1 | -0.4 | +7.0 | -1.1 |
| Japan | -1.4 | -7.7 | -1.5 | -8.4 |
| Korea | -21.5 | -26.5 | -21.6 | -27.0 |
| Australasia | .. | -0.5 | .. | -1.3 |

Note: Latin American access refers to the North American market only.

In the absence of Latin American access to the USA and Canada, international trade prices for ‘grassfed’ beef within the Pacific Rim market were projected to fall less than when such access is granted. Latin American entry to this market results in about a further 1% reduction in ‘grassfed’ beef prices in North America. As a consequence, the export revenues of Australia and New Zealand in the year 2001 are projected to be only slightly lower (around 1.5%) than they would

have been in the absence of South American access to the Canadian and US markets (Table 4.5).

**Table 4.5 Projected Changes Australian and New Zealand Export Receipts:
1995-2001 (1995 US\$millions)**

| | 1995 | 2001: South American access to North America | 2001: No South American access to North America |
|-------------|-------|---|--|
| Australia | 1,534 | 1,729 | 1,758 |
| New Zealand | 626 | 640 | 649 |

Note: Export receipts estimated in 1995 US\$(millions) as the product of export volume and the Australian or New Zealand domestic price, and include revenues from sales to only the modelled countries.

SCENARIOS #2 - #5: EXTENSION OF LATIN AMERICAN ACCESS TO NORTHEAST ASIA

The following projections are based on the same assumptions as those above, with the exception that Japan and Korea are assumed to offer access to beef from Argentina and Uruguay under the same conditions as offered to North American and Australasian suppliers. Tariff rate quotas are still assumed to apply in the USA and Canada. Note that chilled and frozen beef exports from Argentina and Uruguay to the EU are assumed to remain at their 1995 levels of 92,000 and 22,000 tonnes (cwe) as the relatively high returns received would discourage reallocation of these supplies to Asian markets.

No diversion of manufactured beef (scenario #2)

The scenario assumes that none of the beef used for manufactured product exports from Argentina and Uruguay is diverted to frozen or chilled product sales in Asia/Pacific markets²⁰. South American exports to Northeast Asia have the opportunity to expand under this projection scenario until their marginal return equals that obtained from export sales of chilled and frozen beef outside the Pacific Rim arena (but excluding the higher-price EU sales)²¹. At the new equilibrium, these exports are projected at 60,000 MT from Uruguay to Japan, in addition to the 64,000MT exported in total from both suppliers under quota to North America. No beef trade occurs under this scenario from Argentina to Northeast Asia: adding the Japanese import tariff to the landed cost of beef from Argentina makes beef from that source uncompetitive at the originally-estimated freight costs.

²⁰Exports of manufactured beef from Argentina and Uruguay in 1995 were 245,000 and 22,000 tonnes (cwe). In the case of Argentina (for which details were available) average returns were US\$1393 per tonne, compared with average returns of US\$4543 and \$1347 for chilled and frozen exports to the EU, and other destinations, respectively. It is conceivable that at least a part of those supplies currently used in manufactured production could eventually be diverted to Asian chilled and frozen sales. This possibility is explored in the following section.

²¹Two new export demand functions were added to the model: those facing Argentina and Uruguay for non-Pacific sales of chilled or frozen beef. These functions were calibrated to the quantities and average export fob return (chilled and frozen exports to non-EU markets) from 1995 trade data, and the export demand elasticities given in Goddard (1988). They allow the model to determine equilibrium sales from South America to the Pacific Rim markets through recognition of prices in the South Americans' non-Pacific markets.

There is little impact on Pacific Rim beef prices of South American access to Asia - prices of ‘grassfed’ beef in Australasia, North America, Japan and Korea are projected to be less than 1% lower than they would have been had South American exports to the Pacific Rim been restricted to the North American market, while those of ‘grainfed’ beef would remain almost unchanged. At these prices, out-of-quota exports from South to North America would not occur. Average Argentina and Uruguay fob returns on that beef diverted from other markets to Asia and North America are estimated to rise by between 5 and 10% which produces a positive supply response in both countries. However, the projected income and population growth in these Latin countries gives rise to increases in domestic consumption so that the combined export surplus of frozen and chilled beef (excluding that to the EU) falls from 277,000 to 124,000 tonnes. Further, medium-term demand expansion in the EU and other non-Asia/Pacific markets has been ignored in this analysis, which could further reduce the available supplies for Pacific Rim markets.

Compared with the previous scenario where Pacific Rim sales from South America were limited to the US and Canada, the South American expansion into Northeast Asia primarily displaces “grassfed” sales from Australia and New Zealand (see Table 4.6). Thus while North America’s share of the Japanese and Korean import markets remains at a little over 50%, that of Australasia is projected to decline from 47% to 44%.

Table 4.6 Trade Flow Changes in 2001 due to Latin America Access to Northeast Asia (‘000MT cwe)

| From | To North America | | To Japan and Korea | |
|---------------|----------------------|-------------------|----------------------|-------------------|
| | No LA access to Asia | LA access to Asia | No LA access to Asia | LA access to Asia |
| North America | .. | .. | 869 | 869 |
| Australasia | 664 | 711 | 783 | 724 |
| Latin America | 64 | 64 | 0 | 60 |

Note: LA = Argentina and Uruguay

Possible diversion of South American manufactured beef to the Pacific Rim (scenario #3)

In 1995, average fob returns from Argentina’s exports of manufactured beef were US\$1393 per tonne, compared with US\$1347 per tonne for sales of chilled or frozen product to non-EU markets. It is possible that returns from Northeast Asian markets could encourage at least a portion of that beef that had been used for manufactured production to be shipped as chilled or frozen product to Pacific Rim destinations. Analysis of the Argentinian trade data indicated a similar average return on manufactured beef exports to the EU compared with that from manufactured beef sales elsewhere. Hence in this scenario it is assumed that all Argentinian and Uruguayan beef supplies that were used for manufacturing purposes in 1995, in addition to fresh and chilled sales to non-EU markets, could potentially be diverted to Pacific Rim markets. In this

case, the non-Pacific export demand functions facing Argentina and Uruguay were recalibrated at the weighted average returns from non-EU chilled and frozen sales plus all manufactured sales, and the appropriate (cwe) quantities. Thus as supplies are allocated away from non-Pacific markets, prices received from remaining sales to those markets would increase .

Results are summarised in Table 4.7. They differ little from the above scenario, except that exports from Latin America to Japan and Korea have increased by one-third, displacing sales from Australasia and New Zealand. The latter two exporters increase sales somewhat to North America, but also suffer domestic adjustments.

Table 4.7 Trade Flow Changes in 2001 due to Diversion of Latin America Manufactured Beef to Frozen Product ('000MT cwe)

| From | To | North America | | Japan and Korea | |
|---------------|----|----------------------|-------------------|----------------------|-------------------|
| | | No product diversion | Product diversion | No product diversion | Product diversion |
| North America | | .. | .. | 869 | 868 |
| Australasia | | 711 | 727 | 724 | 704 |
| Latin America | | 64 | 64 | 60 | 81 |

Sensitivity of results to South American transport rates (scenarios #4 and #5)

As explained earlier, transport costs out of South America were estimated, as a function of distance, from actual data on Australian and New Zealand transport costs to Northeast Asian and North American markets. In the case of Argentina, it transpires that the transport cost so estimated does not permit profitable trade from that country to Japan or Korea. However, what if the South American transport cost estimates are too high? Further scenarios were modelled in which all transport costs per tonne out of Argentina and Uruguay were reduced , in turn, by 10%, 20% and finally²² 30%. The simulations are analysed twice, with and without the diversion of South American manufactured beef to the Pacific Rim markets.

With no diversion of manufactured beef, sales from the two South American countries to North America are unaffected, since those volumes are restricted by quotas (see Table 4.8). Exports to Northeast Asia increase somewhat within the constraints of the export countries' supply capacities, and at the expense of Australasian exports. The latter adjust through increased sales to North America and through changes in consumption and production within their domestic markets. These scenarios had no impact on North America's markets for 'grainfed' beef in Japan and Korea.

²²A 30% reduction resulted in per tonne costs from South America to North America that were about 30% below the rates from Australasia, and between 10-15% above the Australasian rates to Northeast Asia.

**Table 4.8 Impact of Lower Latin American Transport Costs
on Exports in 2001 ('000MT cwe): No Diversion of Manufactured Beef**

| From | To | North America | | | | Japan & Korea | | | |
|-------------|-----|-----------------------------|-----|-----|-----|-----------------------------|-----|-----|-----|
| | | decrease in transport costs | | | | decrease in transport costs | | | |
| | | nil | 10% | 20% | 30% | nil | 10% | 20% | 30% |
| Nth America | | | | | 869 | 868 | 868 | 868 | |
| Aust'sia | 711 | 717 | 723 | 741 | 724 | 715 | 707 | 685 | |
| Argentina | 29 | 29 | 29 | 29 | 0 | 0 | 0 | 15 | |
| Uruguay | 35 | 35 | 35 | 35 | 60 | 68 | 76 | 83 | |

If we allow Latin American beef that was allocated to manufacturing to be sold as frozen or chilled product, then substantial quantities of Argentinian beef are diverted to Northeast Asia once their transport costs have been reduced by at least 20% from the original estimates Table 4.9). As these freight rates are successively reduced, increased sales from Latin America to Northeast Asia displace 'grassfed' sales from Australia and New Zealand. The latter countries respond through increased sales to North America and through adjustments within their domestic markets. This result appears inconsistent with the pattern of freight costs, which are higher from Latin American to Northeast Asia than from Australasia to that destination. However the reason is that Australasian suppliers have excess quota in North America which can be utilised, whereas exports to that region from Latin America are constrained by their quotas which total only 40,000 tonnes to the USA plus a share of a 4,809 tonne quota to Canada (all product weight). Only minor adjustments to prices occur - a 30% reduction in Latin American freight costs and the ensuing trade flow changes would have the effect of reducing prices of 'grassfed' beef in North America, Japan, Korea and Australasia by about 2%.

Table 4.9 Impact of Lower Latin American Transport Costs on Exports in 2001 ('000MT cwe): With Diversion of Manufactured Beef

| From | To | North America | | | | Japan & Korea | | | |
|-------------|-----|-----------------------------|-----|-----|-----|-----------------------------|-----|-----|-----|
| | | decrease in transport costs | | | | decrease in transport costs | | | |
| | | nil | 10% | 20% | 30% | nil | 10% | 20% | 30% |
| Nth America | | | | | 868 | 868 | 867 | 866 | |
| Aust' sia | 727 | 733 | 831 | 870 | 704 | 695 | 571 | 522 | |
| Argentina | 29 | 29 | 29 | 29 | 0 | 0 | 123 | 166 | |
| Uruguay | 35 | 35 | 35 | 35 | 81 | 89 | 92 | 98 | |

SCENARIO #6: SLOWER ECONOMIC GROWTH IN KOREA

Recent economic events in Asia have led to IMF and other assistance to South Korea and the prospect of slower economic growth in that country. The above scenarios assume a growth rate in GDP of 6%, which when combined with an income elasticity of demand for beef of 1.09 provides projected growth in per person beef consumption of around 5.7% per year. Thus over the projection period of 1995-2001, beef consumption per person in Korea would rise by 40%. This is a much higher consumption growth rate than in other countries examined, and has a major influence on the modelled trade flows and prices. Thus it would be prudent to examine how sensitive are the above findings to a somewhat slower rate of economic growth in Korea. We do this by halving the assumed Korean GDP growth rate, to 3% per year, and recalibrate the Korean demand functions for 'grainfed' and 'grassfed' beef for the year 2001 accordingly. Some of the results are given in Table 4.10, and are calculated for a range of South American freight rates. In each case, it is assumed that South American beef has access to Northeast Asia and may be diverted from manufactured production to the Asia/Pacific chilled and frozen beef trade.

Compared to the previous scenario which assumed a 6% economic growth rate in Korea, that country's total consumption of beef in the year 2001 would fall by 101,000 tonnes (or 16%) due to the slower growth in demand (Table 4.10). Prices of both grainfed and grassfed beef in the same year in Korea fall by less than 1%. Consequently, since domestic prices show little change, there is no domestic supply response so Korea's total imports of beef fall by a similar amount, or by 21%. And compared with 1995, the total increase in Korean beef imports over the projection period is not 85% (see Table 4.2) but 47%.

Table 4. 10 Impact of Slower Korean Growth on Korean Beef Trade ('000MT cwe)

| | 1995 | 2001 with 6% GDP growth | 2001 with 3% GDP growth | % change in 2001 due to lower growth |
|--------------|-------------|--|--|---|
| <i>Korea</i> | | | | |
| Production | 155 | 162 | 162 | 0 |
| Consumption | 416 | 646 | 545 | -15.6 |
| Imports | 261 | 484 | 383 | -20.9 |

All exporters to Korea suffer reduced shipments to Northeast Asia due to slower Korean growth, as can be seen by comparing Table 4.11 with Table 4.9. The combined exports from Australasia to Northeast Asia are reduced by between 10,000 and 30,000 tonnes due to the slower Korean growth, depending on which South American freight costs are used. Australasia's exports to North America increase somewhat, but not by the full extent of their reduced Korean sales.

As freight rates from South America are reduced, a pattern similar to that discussed in the previous section is apparent, with beef from South America replacing that from Australasia in the Northeast Asian markets. Australian and New Zealand industries respond by increasing sales

to North America (where their quotas are not fully met) and through adjustments in their domestic markets.

Table 4.11 Impact of Slower Korean Growth & Lower Latin American Transport Costs on Exports in 2001 ('000MT cwe): With Diversion of Manufactured Beef

| From | To | North America | | | | Japan & Korea | | | |
|-------------|-----|-----------------------------|-----|-----|-----|-----------------------------|-----|-----|-----|
| | | decrease in transport costs | | | | decrease in transport costs | | | |
| | | nil | 10% | 20% | 30% | nil | 10% | 20% | 30% |
| Nth America | | | | | 809 | 809 | 807 | 806 | |
| Aust' sia | 747 | 754 | 837 | 883 | 673 | 666 | 561 | 502 | |
| Argentina | 29 | 29 | 29 | 29 | 0 | 0 | 103 | 157 | |
| Uruguay | 35 | 35 | 35 | 35 | 79 | 87 | 91 | 97 | |

SCENARIO #7: IMPROVED BEEF PRODUCTIVITY IN ARGENTINA

The previous scenarios assumed no change in beef farming productivity in Argentina over the projection period: FAO data on output per head slaughtered over the past decade showed an increase for most of the modeled countries, but the ratio declined for Argentina and Uruguay (see Table 3.6). Cap (1995) reports on a study of the growth potential of Argentina's agricultural sector, under various assumptions about the future adoption of currently available technologies. A number of factors that constrained the rate of adoption of productivity-enhancing innovations in the past, such as lack of operating capital, are being steadily eased due to government policy initiatives and the dynamics of the private sector. New entrants to the agricultural sector (including foreign investors) have good access to capital, are bringing about change to the sector at an increasing rate, and provide the potential for a major shift in the sector's supply capacity by the end of this century.

Cap (1995) used a detailed computer simulation model to examine the implications of new technology adoption on three beef production systems - breeding, breeding/fattening and fattening. Within each system, farms were classified into low-, medium- and high-technology users. Some results are summarised in Table 4.12. Cap considers scenario B to be the most likely, attributable to bottlenecks caused by capacity constraints within the processing stage that would prevent, through price-signaling, the full realisation of farm-level technological potentials. But should the rate of investment in export-oriented processing facilities increase substantially over the near future, productivity levels could be further improved.

Table 4.12 Beef Productivity and Output Projections: Argentina

| Scenario | % yield increase over 10 years on: | | | change in total output 1995-2001 (% per year) |
|----------|---------------------------------------|-------------------|-----------------|--|
| | low-tech farms | medium-tech farms | high-tech farms | |
| A | 10 | 20 | 30 | 2.75 |
| B | 30 | 40 | 50 | 4.75 |
| C | productivity gap is closed - see note | | | 11.60 |

Note: Closure of productivity gap means that the average national yield in 10 years reaches values currently observed in demonstration plots.

Source: Cap (1995).

The following results were obtained by assuming beef production in Argentina increases (at constant prices) at the rate of 4.75% between 1995 and 2001. In addition, Latin American access to Northeast Asia is permitted as is diversion of Latin American beef from manufacturing to fresh uses, and slower economic growth is assumed for Korea. Results were obtained over a range of Latin American freight costs, as before.

At the original Latin American freight costs, an annual 4.5% growth in Argentinian beef productivity was modeled to increase domestic production in the year 2001 from 2,370,000 to 3,107,000 tonnes (cwe). Domestic consumption increased by only a small amount (due to a decline in the domestic price) so that exports in 2001 increased from 140,000 to 857,000 tonnes. Thus most of the increase in Argentinian supply that resulted from productivity growth, added to exports.

The impacts of enhanced beef productivity in Argentina on Pacific Rim beef flows in the year 2001 can be gauged by comparing Tables 4.13 and 4.11. Additional Argentinian exports to North America are restricted by the quotas. At the original freight costs, no exports take place from Argentina to Northeast Asia, but as those freight costs are reduced, exports to Japan and Korea increase substantially. With a 30% reduction in the Argentinian freight costs, exports to Japan and Korea in the year 2001 increase from 157,000 to 281,000 tonnes due to the enhanced productivity in Argentina.

Australasian exports to Northeast Asia are displaced as a result, and are diverted to the North American market. Given a 30% reduction in Argentinian freight costs, the effects of improved productivity in Argentina are to reduce Australasia's exports to Japan and Korea in 2001 from 502,000 to 390,000 tonnes, and to increase their exports to North America from 883,000 to 947,000 tonnes. All USA and Canadian quotas would be fully utilised in this case. Thus while Australasian beef exporters may not be completing utilising their North American quotas at present, reductions in those quotas or diversion of part of their quotas to Latin American exporters may have negative consequences for Australasian exporters in future.

Table 4.13 Impact on Trade Flows of Argentina Productivity Growth with Slower Korean Growth, Lower Latin American Transport Costs and Diversion of Manufactured Beef in 2001 ('000 MT cwe)

| From | To | North America | | | | Japan & Korea | | | |
|-------------|-----|-----------------------------|-----|-----|-----|-----------------------------|-----|-----|-----|
| | | decrease in transport costs | | | | decrease in transport costs | | | |
| | | nil | 10% | 20% | 30% | nil | 10% | 20% | 30% |
| Nth America | | | | | 809 | 808 | 805 | 800 | |
| Aust'asia | 747 | 793 | 921 | 947 | 675 | 617 | 455 | 390 | |
| Argentina | 29 | 29 | 29 | 29 | 0 | 52 | 216 | 281 | |
| Uruguay | 35 | 35 | 35 | 35 | 79 | 85 | 87 | 87 | |

As would be expected, increased Argentinian productivity impacts on beef prices, and within Argentina they decline by between 1.5 and 3% (Table 4.14). At the original freight costs, the productivity improvement has no impact on Argentina's exports to modeled Pacific Rim destinations and therefore produces no impact on prices within those destinations. Should Argentinian freight costs be reduced by up to 30%, beef prices within Australasia could decline by no more than 3% due to productivity gains in Argentina.

Table 4.14 Impact on Domestic Prices in 2001 of Argentina Productivity Growth with Slower Korean Growth, Lower Latin American Transport Costs and Diversion of Manufactured Beef (% change)

| | decrease in transport costs | | | |
|--------------|-----------------------------|------|------|------|
| | nil | 10% | 20% | 30% |
| Nth America | 0 | -0.5 | -1.2 | -0.9 |
| Japn & Korea | 0 | -0.5 | -1.2 | -2.5 |
| Aust'asia | 0 | -0.6 | -1.5 | -3.0 |
| Argentina | -1.7 | -1.7 | -1.5 | -3.1 |

SCENARIO #8: MERCOSUR COUNTRIES JOIN NAFTA

Argentina and Uruguay joined with Brazil and Paraguay in the common market called MERCOSUR in 1995. It is the third-largest free trade area after NAFTA²³ and the EU and has eliminated most internal tariffs between the member countries. As a result trade amongst the member countries has increased fourfold between 1990 and 1996. The Summit of the Americas held in Miami recently initiated a plan to create a free trade area of the Americas by the year

²³ The North American Free Trade Agreement, involving the USA, Canada and Mexico.

2005. This was seen as integrating all countries of North, Central and South America, and thus would involve the merger of NAFTA and MERCOSUR. Provided this free trade agreement was to cover all agricultural products, then the beef trade between South and North America would be duty free. This is of no little importance to New Zealand since it could have a considerable trade diversion effect.

To illustrate what such a diversion of trade might be with regard to beef, this scenario assumes that the North American tariff rate quotas currently applied to Argentina and Uruguay are eliminated and the beef trade between those countries is duty free. The North American tariff rate quotas that restrict imports of beef from Australia and New Zealand remain in place. Otherwise, this scenario is similar to the previous one.

Table 4.15 Impact on Trade Flows of NAFTA/MERCOSUR Integration, plus Argentina Productivity Growth, Slower Korean Growth, Lower Latin American Transport Costs and Diversion of Manufactured Beef in 2001 ('000 MT cwe)

| From | To | North America | | | | Japan & Korea | | | |
|-------------|----|-----------------------------|-----|-----|-----|-----------------------------|-----|-----|-----|
| | | decrease in transport costs | | | | decrease in transport costs | | | |
| | | nil | 10% | 20% | 30% | nil | 10% | 20% | 30% |
| Nth America | | | | | 800 | 798 | 797 | 796 | |
| Aust'asia | | 526 | 499 | 472 | 461 | 764 | 767 | 767 | 769 |
| Argentina | | 646 | 765 | 883 | 932 | 0 | 0 | 0 | 0 |
| Uruguay | | 130 | 130 | 131 | 134 | 0 | 0 | 0 | 0 |

The impacts on trade flows are given in Table 4.15. These flows can be compared with those of Table 4.13 to gauge the effect of the freeing up of South American access to NAFTA markets. Any exports of beef from Argentina and Uruguay to Northeast Asia are, under this scenario, redirected to either US and Canada where entry is free. As a consequence, Australasian exports to North America are displaced, and in turn redirected to Northeast Asia. This diversion of trade, however, may be thought of as a correction of the trade diversion caused in earlier scenarios by the quota restrictions on South American beef into North America which encouraged their trade with Northeast Asia.

While the total quantities of grassfed beef imported into Japan and Korea are little changed (only the sources are different), quantities of beef imported into North America increase by over 50%. This has a depressive effect on domestic beef prices in North America, especially of grassfed beef, which would decline by about 7%. In contrast, North America prices for grainfed beef decline by less than 1% due to the relatively weak substitution in consumption between the two types of beef. Market shares change substantially therefore - that of Australasian exporters could fall from over 90% in the previous scenario to as little as 30% of total North American exports.

Domestic beef prices in New Zealand suffer as a result of the decline in grassfed beef prices in North America, and our results suggest a decline of 7% - 8%. This, in turn, would in the longer run produce a reduction in beef output in New Zealand by perhaps 3% and a decline in export receipts. To some extent, these negative impacts on New Zealand could be made up through increased sales to other markets not covered in our analyses.

SCENARIO #9: DISMANTLING OF THE NORTH AMERICAN TARIFF RATE QUOTA SYSTEM

Procedures adopted in the implementation of some of the tariff rate quotas negotiated in the Uruguay Round have given rise to concern in some countries. These generally relate to the mechanism chosen by the importing country to allocate the quota among either domestic importers or foreign exporters, and influences also the distribution of any quota rents. Further, where quotas have also been specified across countries of origin, such as the North American beef quotas, individual supplier countries may feel aggrieved. The tariff rate quota system will no doubt be high on the priority list for the next round of WTO trade negotiations, due to begin in 1999. Possible outcomes could include improved procedures for the allocation of quota rights, expansion of the total quota, changes in quota allocations to individual exporting countries, reductions in within- or without-quota tariffs, or elimination of the quotas altogether and their replacement by tariffs.

Even with our attention restricted to the US and Canadian beef tariff quotas, a very large number of possible scenarios could be developed. To provide a flavour of what might occur and its impact on the Pacific Rim beef trade, this scenario assumes that both the US and Canada dismantle their tariff rate quotas, and replace them with a tariff that would result in the equivalent volume of imports that would have occurred under the quota system²⁴. Thus Australasian and Latin American exporters would compete on the North American market on the basis of their supply costs and not be hindered by quantitative restraints.

In only scenario #7 (Table 4.13) do both Australia and New Zealand simultaneously supply the US and Canadian markets to the limits of their quotas, whereas Argentina and Uruguay do in all scenarios. This results, in many scenarios, with Latin American sales displacing those of Australasia in Northeast Asia (ie Latin America's more distant markets) while Australasian sales to North America expand. Such a pattern of trade defies relative transport costs, and results because of the imposition of the system of country quotas. Thus scenario #9 should also result in trade patterns that more logically reflect transport costs among the Pacific Rim exporters and importers.

The only difference between the scenario reported in Table 4.13 and that of Table 4.16 below is that the North American quotas have been replaced by an ad valorem tariff that resulted in the equivalent volume of imports. Thus total North American imports in the former Table are

²⁴ This was achieved in the computer model by varying the tariff applied to imports into North America until total beef imports reached the required volume.

approximately similar to those in Table 4.16. It can be noted that, in the year 2001, a North American tariff of between 8% and 10% is estimated to be equivalent to the trade barriers that would be erected by the tariff rate quotas.

Table 4.16 Impact of Removal of North American Quotas in 2001 on Exports ('000MT cwe): with Argentina Productivity Growth, Slower Korean Growth, Lower Latin American Transport Costs and Diversion of Manufactured Beef

| From | To | North America | | | | Japan & Korea | | | |
|-------------|-----|-----------------------------|-----|-----|-----|-----------------------------|-----|-----|-----|
| | | decrease in transport costs | | | | decrease in transport costs | | | |
| | | nil | 10% | 20% | 30% | nil | 10% | 20% | 30% |
| Nth America | | | | | 791 | 788 | 786 | 783 | |
| Aust'asia | 545 | 516 | 489 | 460 | 763 | 766 | 767 | 770 | |
| Argentina | 152 | 220 | 346 | 422 | 0 | 0 | 0 | 0 | |
| Uruguay | 126 | 126 | 127 | 127 | 0 | 0 | 0 | 0 | |
| Tariff (%) | 8 | 9 | 9 | 10 | | | | | |

However, there are substantial changes to the structure of North American imports. As might be expected, imports from Latin America are well above the total 64,000 tonnes (cwe) allowed by the current quotas. Depending on the level of Latin American freight costs, the combined Argentinian and Uruguayan share of North American imports lies between one-third and one-half. These increased sales from South into North America are diverted from Northeast Asia, and under this scenario there would be no beef exports from South America to Japan or Korea. Reductions in South American freight costs have the effect of increasing their exports to North America, and their share of that market, displacing supplies from Australasia which are redirected to the markets of Northeast Asia.

Note also that Australasia's increased sales to Japan and Korea due to the change in North American policy are always less than the reduction in their North American exports. As a result (at least in the model results) the Australian and New Zealand beef industries respond through a reduction in supply (about 3% in the case of New Zealand) and a reduction in domestic beef prices (about 7% in New Zealand's case). In reality these reductions could be tempered somewhat through increased exports to markets not modelled here, such as in Southeast Asia.

How might exporter revenues be effected by these policy-induced changes to the structure and direction of the Pacific Rim beef trade? In this scenario, irrespective of which set of Latin American freight costs is assumed, New Zealand export revenues from the modelled countries would decline by around 12% due to the replacement of the North American tariff rate quotas

with equivalent ad valorem tariffs. Those of Argentina and Uruguay increase by between 1% and 10%, depending on the level of their freight costs (Table 4.17).

Table 4.17 Impact of Removal of North American Quotas on Export Revenues in 2001 (1995 US\$ million)

| | Actual quotas | | Equivalent tariff | |
|-------------|--|-------|--|-------|
| | Decrease in South American transport costs | | Decrease in South American transport costs | |
| | nil | 30% | nil | 30% |
| Australia | 1,679 | 1,534 | 1,469 | 1,331 |
| New Zealand | 623 | 678 | 550 | 503 |
| Argentina | 1,169 | 1,197 | 1,178 | 1,205 |
| Uruguay | 156 | 170 | 173 | 175 |

Note: For Argentina and Uruguay, export revenues exclude those derived from exports to the EU but include those from frozen or chilled product to other non-Pacific markets; for Australasia, revenues exclude those from exports to all countries other than those modelled. Export revenues include quota rents where applicable.

Chapter 5

Conclusions And Suggestions For Future Study

MAJOR FINDINGS

If South American entry to the Pacific Rim beef market was limited to their existing quotas in North America, our results suggest that impacts on those Pacific Rim markets would be minimal. Indeed, this has been the experience so far. It can be expected, however, that importing countries such as Japan and South Korea will have opened their markets to beef from FMD-free regions of South America probably well before the year 2001. This presents the potential for more substantial impacts on regional markets, and outcomes will depend in part on the size of the Argentinian exportable surplus of frozen or chilled beef. This can be expanded through the diversion of product from use in 'manufactured' beef to fresh uses, and current moves to increase investment in the beef sector will facilitate such a change. But even so, future economic growth in South America and increased intra-regional trade within MERCOSUR will provide expanding market opportunities for countries such as Argentina.

Another potential contributor to growth in Argentina's exportable surplus of beef is productivity growth in its domestic beef production systems. FAO data on beef production per livestock slaughtered showed that over the past decade, in contrast to the other modeled countries, this measure of productivity had declined in Argentina. But recent research from Argentina suggests a considerable potential exists to improve productivity over the years ahead. Depending on the choice of scenario, this research suggests that total beef production in Argentina could increase at the rate of between 2.8% and 11.6% per year between 1995 and 2001. The researcher's 'most likely' scenario produced a growth rate of 4.75% per year, which was used in some of our modelling.

Some of our results are summarised in Table 5.1 (which assume the slower rate of GDP growth in Korea). Analyses using our initial estimates of transport costs resulted in no trade flows from Argentina to Northeast Asia. Thus allowing for the diversion of manufactured beef to fresh beef in the South American countries produced a relatively small increase in their sales to Northeast Asia, because of the relatively small supply expansion capacity in Uruguay. Next, allowing for a positive rate of beef productivity growth in Argentina had no effect at all on the Northeast Asian market, since Argentina did not export to that region at our initial estimate of Latin American freight costs. The North American trade in grassfed beef was also insensitive to these changes, as was the volume of New Zealand's total beef exports to the modeled countries and the New Zealand domestic price.

Table 5.1 Summary of Some Results: Latin American Access to Pacific Rim Beef Markets at Initial Transport Cost Estimates ('000 MT cwe)

| | No diversion of LA manufactured beef | Diversion of LA manufactured beef | Diversion of manufactured LA beef & productivity growth in Argentina |
|---|---|--------------------------------------|--|
| <i>North America</i> | | | |
| total imports | 795 | 811 | 811 |
| from Australasia | 731 | 747 | 747 |
| from Latin America | 64 | 64 | 64 |
| <i>Japan/Korea</i> | | | |
| total imports | 570 | 570 | 572 |
| from Australasia | 512 | 491 | 493 |
| from Latin America | 58 | 79 | 79 |
| New Zealand total exports | 426 | 426 | 426 |
| New Zealand beef price index | 100 | 99.7 | 99.7 |

Note: All volumes refer to 'grassfed' beef only.
LA = Argentina and Uruguay.

Results turned out to be much more sensitive to the level of freight costs from Latin America to Pacific Rim markets. The effects of reducing these by up to 30% are summarised in Table 5.2. Total imports by Japan and Korea increased little when Latin American freight costs were decreased, but market shares changed substantially - from an Australasian share of 86% with the initial freight costs to a share of only 36% should Latin American transport costs fall by 30%. Australasian beef is diverted to the North American market, whose total imports would increase. But only when those freight costs were reduced by 30% was the quantity to be diverted from Northeast Asia of sufficient volume to fully meet the North American quotas. Reductions in Latin American freight costs also impacted therefore on New Zealand's total exports to the modeled countries, and on the domestic beef price within New Zealand.

Table 5.2 Summary of Some Results: Latin American Access to Pacific Rim Beef Markets at Reduced Latin American Transport Costs ('000 MT cwe)

| | Reduction in Latin American Transport Costs | | | |
|-------------------------------------|---|------|------|-------|
| | nil | 10% | 20% | 30% |
| <i>North America</i> | | | | |
| total imports | 811 | 857 | 985 | 1,011 |
| from Australasia | 747 | 793 | 921 | 947 |
| from Latin America | 64 | 64 | 64 | 64 |
| <i>Japan/Korea</i> | | | | |
| total imports | 572 | 572 | 576 | 577 |
| from Australasia | 493 | 435 | 273 | 209 |
| from Latin America | 79 | 137 | 303 | 368 |
| New Zealand total exports | 426 | 423 | 416 | 410 |
| New Zealand beef price index | 100 | 99.3 | 97.1 | 94.9 |

Notes: 1. All volumes refer to 'grassfed' beef only.
2. These results assume diversion of Latin American beef to frozen or chilled production, slower Korean economic growth and productivity growth in the Argentina industry.

North American beef import policies could undergo further change over the medium term. Should the tariff rate quota system be retained, then individual supplier allocations might change. The existing allocations to Argentina and Uruguay are relatively small, and could result in quantities of beef from those sources being shipped to Northeast Asia and causing a re-direction of Australasian sales from the latter markets to North America. One political development that could produce a change to the quota allocations would be the integration of the MERCOSUR free trade area with NAFTA. Assuming this would result in duty free and quantitatively-unrestricted South American access to the USA and Canada, exports of 'grassfed' beef from Argentina and Uruguay to North America could reach almost 400,000 tonnes (Table 5.3), compared with today's quota allocations that allow a maximum of 64,000 tonnes (cwe). That finding assumes no growth in Argentinian beef productivity between 1995 and 2001 - should a productivity growth rate of 4.75% per year be maintained, exports from Argentina and Uruguay to North America could reach close to 800,000 tonnes. And if our South American freight costs are over-estimated by 30%, those exports could exceed 1 million tonnes.

Clearly, this combination of events would produce major changes into the Pacific Rim beef markets. The Australasian 'grassfed' industries adjust through diversion of exports from North America to Northeast Asia, and through price-induced supply contraction. Beef prices in New Zealand could be reduced by more than 10% from the level that would had applied had the current tariff rate quotas been maintained.

Table 5.3 Summary of Some Results: Unrestricted Latin American Access to North America Under MERCOSUR/NAFTA Integration ('000 MT cwe)

| | Existing North American quotas | MERCOSUR/NAFTA Integration | | | |
|-------------------------------------|--------------------------------|-----------------------------|---------------------------------------|----------------------------|----------------------------|
| | | Zero Argentina productivity | With productivity growth in Argentina | | |
| | | | Initial freight costs | 10% freight cost reduction | 30% freight cost reduction |
| <i>North America</i> | | | | | |
| total imports | 811 | 1,008 | 1,302 | 1,394 | 1,527 |
| from Australasia | 747 | 611 | 526 | 499 | 461 |
| from Latin America | 64 | 397 | 776 | 895 | 1,066 |
| <i>Japan/Korea</i> | | | | | |
| total imports | 570 | 576 | 583 | 586 | 588 |
| from Australasia | 491 | 576 | 583 | 586 | 588 |
| from Latin America | 79 | 0 | 0 | 0 | 0 |
| New Zealand total exports | 426 | 415 | 401 | 395 | 389 |
| New Zealand beef price index | 100 | 96.8 | 2.0 | 90.5 | 88.3 |

Notes: 1. All volumes refer to 'grassfed' beef only.
2. These results assume diversion of Latin American beef to frozen or chilled production, and slower Korean economic growth.

The other change to North American beef policy that we explored was the replacement of the tariff rate quota system with an equivalent ad valorem tariff - ie that tariff that would result in the same volume of total imports into North America. Our findings were similar to those explained immediately above, but less severe from an Australasian perspective since total North American imports could not expand. Exporters from Australia and New Zealand would suffer a reduction in total exports to North America and market share, but the results suggest that South American exports within the Pacific Rim would be confined to North American markets.

SUGGESTIONS FOR FURTHER STUDY

Substitution between types of beef in Japanese and Korean consumption

Our analyses have attempted to differentiate beef products depending upon whether they derived from grainfed or grassfed animals. This required estimates of the extent to which they are viewed as substitutes in consumption. The estimates used for North America were derived from product classifications that fitted rather well to those adopted in this study. However, further work is required on the degree of substitution in Japan, between native beef, beef from the domestic dairy herd, and imported grainfed and grassfed product. This study has aggregated the first three product types as 'grainfed' beef. But the parameter we used to capture substitution between this aggregate and 'grassfed' beef was that estimated between native Wagyu beef and an aggregate comprising Japanese dairy beef and imported beef. Consequently, the actual strength of the substitution relationship for our beef aggregates could be somewhat higher than that employed in this study. The implications for our results is that we may have over-estimated the degree of independence of the two beef markets in Japan, and hence over-estimated the impacts of Latin American entry on the grassfed beef market.

Grainfed beef production in Australia and Latin America

Both Australia and Argentina are major and low-cost producers of grain. Australia has already begun producing grain-finished beef for the Japanese market, and is expected to increase its share of total exports to that market. This is one way in which the beef sector can to some extent be separated from the implications of South American entry into grassfed beef markets. Our analyses assume that South American beef industries do not adopt grainfeeding . A close watch should be kept on such developments in South America, as adoption of grainfeeding would lessen the impacts on grassfed beef markets of their entry to Pacific Rim markets.

Freight costs

Whether or not South American suppliers would choose to export to Asian markets depends critically on their freight costs to those markets. We could not obtain reliable estimates of relevant beef freight costs, so made estimates based on other actual costs and distances. Under some circumstances, our results show that South American suppliers could win substantial market share in Northeast Asia should their freight costs per tonne be no more than 10%-20% above rates from Australasia. Thus a close monitoring of developments in relative freight costs is important.

Beef productivity in Latin America

Our work has referenced research findings from Argentina that suggest considerable increases in beef output due to the adoption of currently available technology. Our analysis indicates that this is a very important issue in determining the extent to which Argentina may be able to penetrate Pacific Rim markets. Should these production increases take place, considerable exportable surpluses are likely to exist and could find their way to Asian markets given competitive freight costs. A close watch should be kept on productivity developments in the beef sectors of South America, and where gains are achieved the New Zealand industry should work to match them in order to remain competitive.

Investment in Latin American farming, food processing and marketing

Of the Latin American food exporters, we obtained information that at least Argentina is likely to become a dependable large-scale supplier of high-quality food products, due to unprecedented investments and innovation in its agricultural research and development system, and involving both domestic and foreign investors. This is expected to lead to lower production, processing, and marketing and distribution costs, and the improvement of product quality. The New Zealand industry should keep a close watch on these developments and respond accordingly to maintain their desired market positions.

A New Zealand linkage to NAFTA

Integration of the North American Free Trade Agreement with the Latin American free trade area called MERCOSUR is already on the political drawing board. Our results indicate that when this occurs, assuming free access to North America for beef is granted, then South American suppliers will win a large share of that market at the expense of New Zealand and Australian suppliers. Should the New Zealand industry wish to maintain a presence in the US market, then work will be required to gain similar access conditions. One approach would be to actively support the idea, already mooted, for closer relations between New Zealand and NAFTA. This might even extend to an integration of CER with NAFTA. Unless something like this occurs, New Zealand is likely to lose important North American markets, and not just those for beef, in the advent of a North American-South American free trade area becoming a reality.

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APPENDIX SOURCES OF COUNTRY DATA

General

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Uruguay

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Other Institutions that assisted

New Zealand Meat Industry Association

Crown Meat Exporters

P&O Containers Ltd

Trade Negotiations Division, New Zealand Ministry of Foreign Affairs and Trade

New Zealand Meat Producers' Board

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