

# The Contribution of the Primary Sector to New Zealand's Economic Growth

*Alex Harrington*

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The Contribution of the Primary Sector to New Zealand's  
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**AUTHOR**

Alex Harrington  
The Treasury  
PO Box 3724  
Wellington 6008  
NEW ZEALAND

Email [alex.harrington@treasury.govt.nz](mailto:alex.harrington@treasury.govt.nz)

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**NZ TREASURY**

New Zealand Treasury  
PO Box 3724  
Wellington 6015  
NEW ZEALAND

Email [information@treasury.govt.nz](mailto:information@treasury.govt.nz)

Telephone 64-4-472-2733

Website [www.treasury.govt.nz](http://www.treasury.govt.nz)

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## Summary

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The primary sector has performed well in the past...

The growth of New Zealand's primary sector has been strong relative to the whole economy over the last 25 years. This strong growth is driven largely by the performance of agriculture, and reflects natural comparative advantage, sustained productivity increases, favourable terms of trade, the development and application of new technology, exploitation of economies of scale, and the benefits of increasingly stable macroeconomic settings, high quality institutions and clear price signals.

...and is well placed to meet future challenges...

Looking to the future, the primary sector has a generally positive growth outlook. Some of the key factors that will influence the sector's future performance include international trade conditions, environmental constraints (in particular water and climate change), property rights, biosecurity threats and human capital issues.

...though there is still a role for government to play.

The future performance of the primary sector will largely be determined by the response of the individuals and firms in the sector to the external environment in which they operate. That said, the government can provide an underpinning for growth by providing a business-friendly environment (through, for instance, strong institutions, clearly defined property rights, clear price signals and low levels of regulation), by continuing to promote freer international trade, and by managing environmental impacts carefully.

# Contents

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<b>Summary</b> .....	<b>i</b>
<b>Contents</b> .....	<b>ii</b>
<b>Introduction</b> .....	<b>1</b>
<b>The Primary Sector’s Growth Performance</b> .....	<b>2</b>
Key Policy Directions .....	2
Commodity Price and Exchange Rate Movements .....	3
Output Performance .....	5
Productivity Performance.....	8
<b>Prospects for the Primary Sector</b> .....	<b>10</b>
<b>Role for Government</b> .....	<b>14</b>
<b>References</b> .....	<b>16</b>
<b>Annex One: Historical Performance Sector-by-Sector</b> .....	<b>19</b>
Red Meat and Wool .....	19
Dairy Farming .....	22
Fishing .....	25
Horticulture .....	26
Forestry .....	27
Mining .....	28
<b>Annex Two: Prospects Sector-by-Sector</b> .....	<b>30</b>
Red Meat and Wool .....	30
Dairy Farming .....	31
Fishing .....	33
Horticulture .....	35
Forestry .....	36
Mining .....	37

# The Contribution of the Primary Sector to New Zealand's Economic Growth

## Introduction

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The primary sector, which for the purposes of this paper spans agriculture (red meat and wool, dairy farming and horticulture), fishing, forestry and mining, has been the basis of New Zealand's economy since the arrival of Europeans in the eighteenth century. The nature of primary sector activity has evolved from extractive activities with little further processing – whaling, sealing and mineral extraction by early European visitors and settlers, and the hunting of seals and native birds by Māori before them (King, 2003) – to a more sustainable use of natural resources.

The primary sector has been a key part of New Zealand's growth story for a long time, and continues to contribute

Despite considerable economy-wide diversification of production through the twentieth century, the primary sector's climate-based comparative advantage ensures that it still plays an important role today. The primary sector directly contributes \$8.4 billion (1995/96 prices), or 6.8%, to the country's Gross Domestic Product (GDP). If the primary sector's backward and forward links to the rest of the economy are included as well,<sup>1</sup> the contribution grows to around 17% of GDP (Edlin, 2004, using data from the Meat and Wool Economic Service) and two-thirds of New Zealand's merchandise exports. The primary sector is well integrated with other parts of the economy, such as tourism and recreation.

Where will the primary sector go in the future?

This paper seeks to better understand the contribution that the primary sector makes to New Zealand's economic growth. It does this by quantifying the growth of the sector over time, considering what has underpinned this growth, looking ahead to the opportunities and the risks for the sector's future growth, and considering the lessons for policy makers

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<sup>1</sup> I.e. including a portion of (i) input industries such as fertiliser, (ii) intermediate industries such as transport, and (iii) downstream manufacturing.

in encouraging the sector's growth in the future. This analysis is undertaken at a high level in the body of the paper, with more detail at a sub-sectoral level included in Annexes One (historical performance) and Two (prospects for growth).

In examining the primary sector's growth performance, it is useful to bear in mind the fundamentals that underpin growth more generally. The existence of strong property rights, clear price signals and an institutional environment that allows agents to exchange goods and services are all critical ingredients to achieving growth (Rozelle and Swinnen, 2004). The extent to which these pillars of growth have shifted over time in New Zealand will have had an impact on the country's growth performance.

## The Primary Sector's Growth Performance

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This section considers the performance of the primary sector relative to the rest of the economy over recent years. It begins by summarising key policy trends with respect to the primary sector, and provides information on commodity price and exchange rate movements. It then presents data on the primary sector's output growth performance and summarises research into the sector's productivity performance.

### Key Policy Directions

New Zealand's production and export base in the late nineteenth century and early-to-mid-twentieth century was dominated by primary produce: meat, butter and wool. These were exported mainly to the United Kingdom. The export receipts paid for imports such as manufactures, intermediate inputs, consumer goods and oil. This left the economy vulnerable to changes in weather, commodity prices and the purchasing arrangements of those who bought our products.

Recognising this, particularly from the 1960s onwards, the government encouraged the expansion and diversification of export products and markets, through a range of financial and non-financial incentives and direct government involvement in production.<sup>2</sup> The government also took steps to insulate the economy from external shocks. Exporters were protected from price fluctuations by government-backed minimum prices. Attempts were made to reduce the economy's reliance on imports, through increasing levels of import regulation and the development of natural gas resources.

Our economic base used to be pretty narrow, and steps were taken to diversify and expand production.

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<sup>2</sup> This was made more urgent by the rapid expansion of trade in manufactures from the 1960s (which New Zealand producers were largely not benefiting from), the United Kingdom entering the European Economic Community in 1973, and the 1970s oil shocks.

Despite receiving considerable government assistance through mechanisms such as minimum prices, land development grants and direct subsidies, assistance given to other parts of the economy meant that the primary sector faced overall negative rates of assistance.<sup>3</sup>

This broad approach became increasingly costly and unsustainable. The 1980s and 1990s saw substantial economic reform, providing greater exposure to signals from international markets about the value of our exports, and sharper incentives to produce what world consumers wanted. The New Zealand dollar was floated, much of the distortionary government assistance to industry was removed, producer board arrangements were reformed and government's role in production was reduced. These reforms paved the way for considerable land use changes in response to changing international market conditions.

Changes have been made to get clearer signals to producers, and to manage resources sustainably.

Another significant policy theme from the 1980s onwards was a greater recognition of the need to manage resources in a sustainable way. The government legislated for a sustainable management approach in specific areas – such as the fishing sector from the mid-1980s – and more generally through the Resource Management Act in the early 1990s.

These policy trends have had an effect on the output performance of the primary sector, both overall and in terms of its composition.

## Commodity Price and Exchange Rate Movements

New Zealand's primary sector producers are generally price takers on international markets. There is a general long-term trend of declining commodity prices in inflation-adjusted terms,<sup>4</sup> though there are short-term variations that impact on the performance of the different parts of the primary sector. Volatility in commodity prices is something the primary sector has to cope with and which it has little influence over.

Our primary producers are price takers on international markets.

Figures 1 and 2 below show the movements in key world commodity prices since 1986.<sup>5</sup> Commodity prices have generally moved through a five year cycle, with peaks in the late 1980s, mid-1990s, early 2000s and the mid-2000s, though it is not clear yet if the current cycle has peaked.

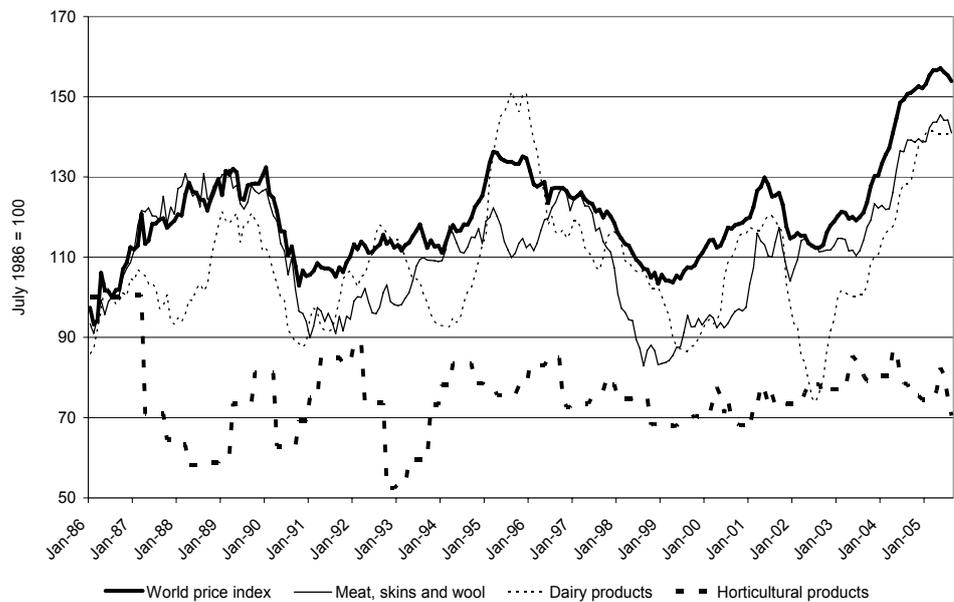
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<sup>3</sup> Tyler and Lattimore, in Sandrey and Reynolds (1990), estimate that agriculture faced a rate of assistance of negative 12% in 1981/82.

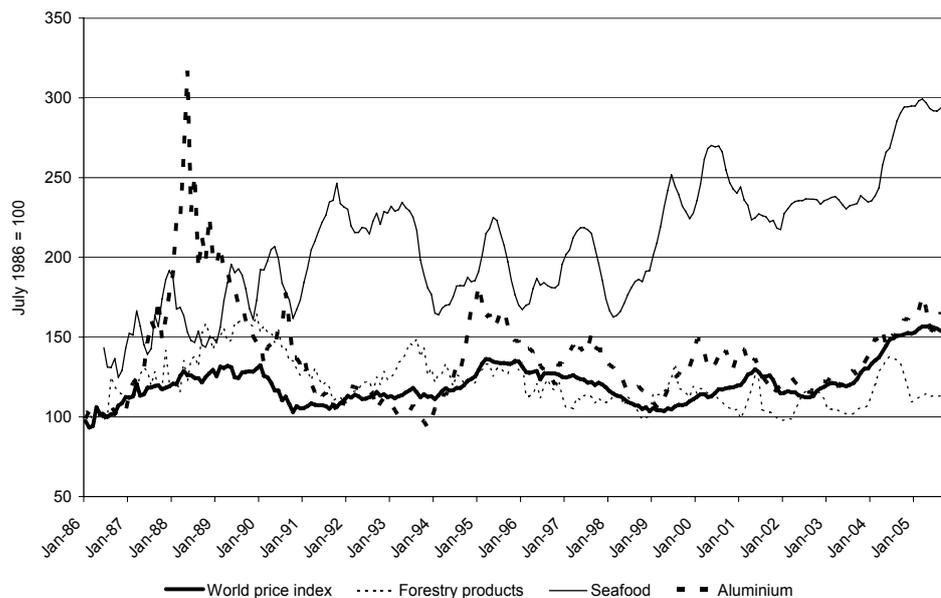
<sup>4</sup> This is not a clear-cut trend; it is clouded, for instance, by the extent to which commodity products can compete on non-price features. It also differs from commodity to commodity and depends on the deflator used to derive an inflation-adjusted price. That said, factors cited as drivers of commodity price decline include low barriers to entry, development of man-made substitutes (e.g. for wool and wood) and changing preferences leading to a lower proportion of consumer spending on commodity products. The challenge for commodity producers is to improve productivity to maintain profitability. See Winsley (2004) for a useful discussion of features and trends of commodity products.

<sup>5</sup> Figures 1 and 2 use the ANZ Commodity Price Index series as a data source. The Index uses the appropriate exchange rate index for each commodity to reflect its mix of markets.

**Figure 1 – ANZ Commodity Price Index (World Prices) Part A**



**Figure 2 – ANZ Commodity Price Index (World Prices) Part B**



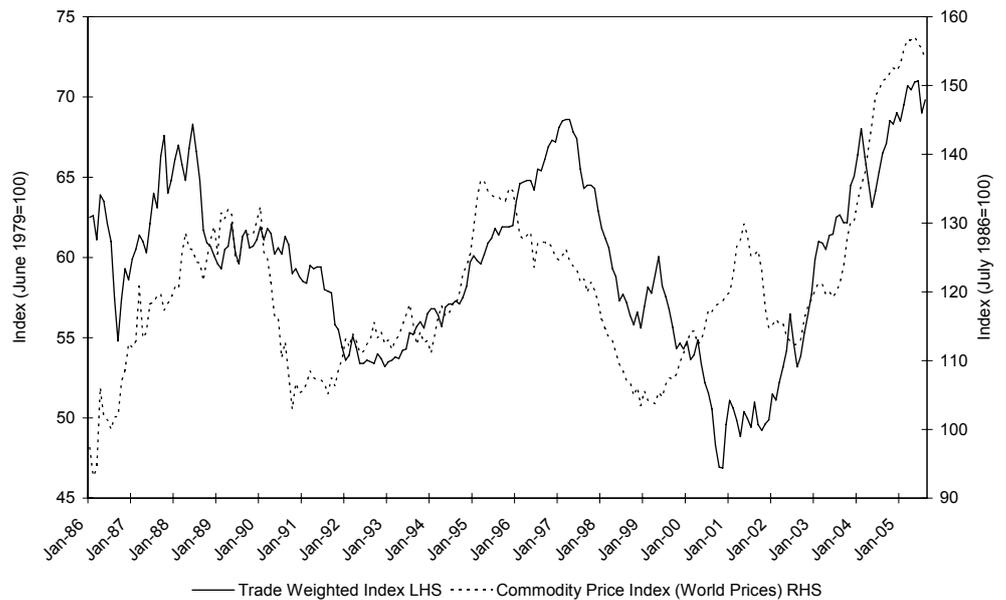
Source: ANZ Commodity Price Index – Historical Series and Component Indices<sup>6</sup>

Our primary producers have to deal with volatility in commodity prices and exchange rates.

The prices that our exporters receive in New Zealand dollars are also influenced by changes in the exchange rate. As can be seen from Figure 3 below, the value of the New Zealand dollar has been volatile since it was floated in 1985, which is another source of uncertainty for our exporters. Generally speaking though, the exchange rate has tended to move in the same direction as overall commodity prices, smoothing the impact on the New Zealand dollar prices that our exporters receive.

<sup>6</sup> Figure 2 uses a six month average for Seafood prices up to the end of 2000 to smooth particularly volatile data.

**Figure 3 – Commodity Price and Exchange Rate Movements**



Source: Reserve Bank of New Zealand Historical Exchange Rate Series; ANZ Commodity Price Index – Historical Series and Component Indices

## Output Performance

The sector's recent output growth performance is outlined in Table 1 below.

**Table 1 – New Zealand's Real GDP Growth 1978-2005**

Sector of NZ economy	Annual % growth 1978-2005 <sup>7</sup>	Annual % growth 1978-1989	Annual % growth 1990-2005
Whole economy	2.5%	2.0%	2.8%
Primary sector	2.6%	3.0%	2.3%
<i>Made up of...</i>			
Agriculture	3.2%	3.9%	2.6%
Fishing	2.5%	6.5%	-0.4%
Forestry and logging	3.5%	4.3%	2.9%
Mining and quarrying	0.1%	-0.8%	0.8%

Source: Statistics New Zealand, GDP by Industry

The primary sector's output growth has outperformed the wider economy, particularly through the 1980s.

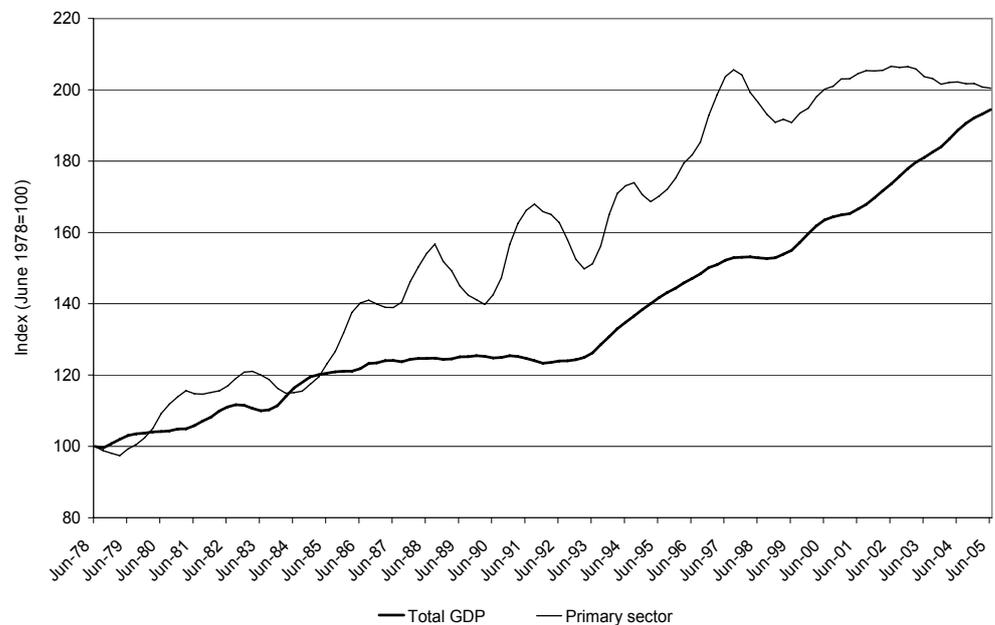
As Table 1 demonstrates, the primary sector performed particularly well relative to the wider economy over the period 1978-1989. This was driven by the growth of agriculture in the second half of the 1980s, the growth of forestry and logging, and the stagnation of the wider economy from the mid-1980s as economic reforms were undertaken and the sharemarket

<sup>7</sup> The choice of time period can have a significant effect on average annual growth rates. Primary sector output contracted at the start of this period, as can be seen in Figure 4 below. If this period is excluded, the figures for the whole economy and the primary sector are 2.5% and 2.8% respectively.

crashed. Conversely, the wider economy performed better than the primary sector over the period 1990-2005, because of the wider economic recovery from 1993 onwards, and as primary production growth (with the exception of mining) eased.

Figure 4 below shows the growth in real GDP for the primary sector and the whole New Zealand economy for the period 1978-2005 in more detail. Over this period the primary sector has grown faster than the wider economy, with a particularly strong relative performance from the mid-1980s through until the late 1990s. The gap has closed in recent years. Primary production has clearly been much more volatile than that of the economy as a whole, which reflects the impact of shocks such as droughts and floods, plus the primary sector's greater exposure to exchange rate and commodity price cycles.

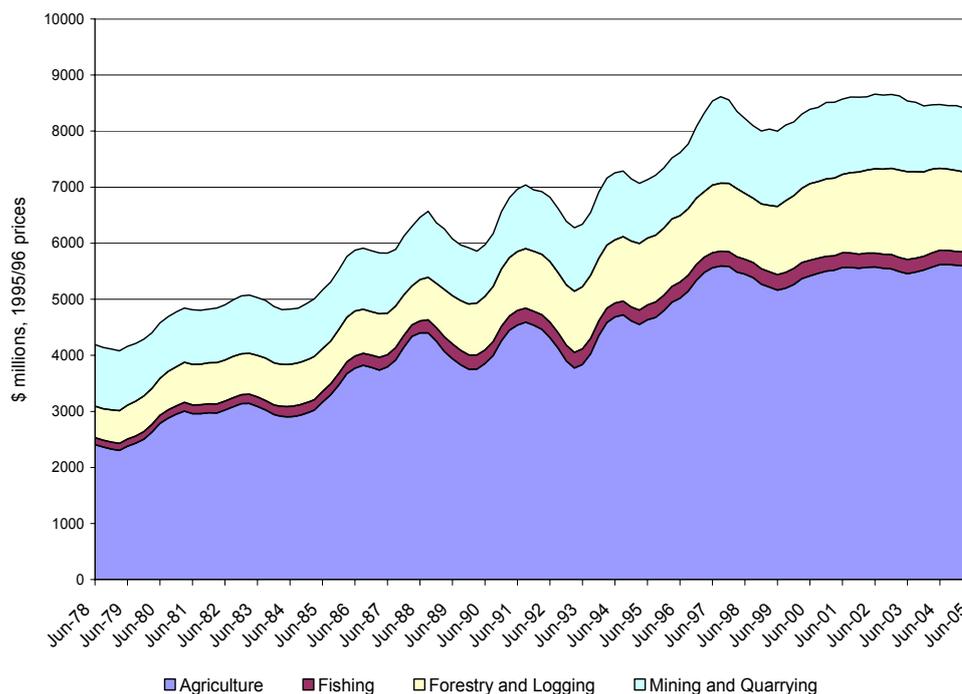
**Figure 4 – New Zealand's Real GDP Growth**



Source: Statistics New Zealand, GDP by Industry

The contributions of the various sub-sectors of the primary sector (agriculture, fishing, forestry and logging, and mining and quarrying) to primary sector growth are shown in Figure 5 below.

**Figure 5 – Components of Primary Sector Output**



Source: Statistics New Zealand, GDP by Industry

Agriculture has played a key role in this strong output growth performance.

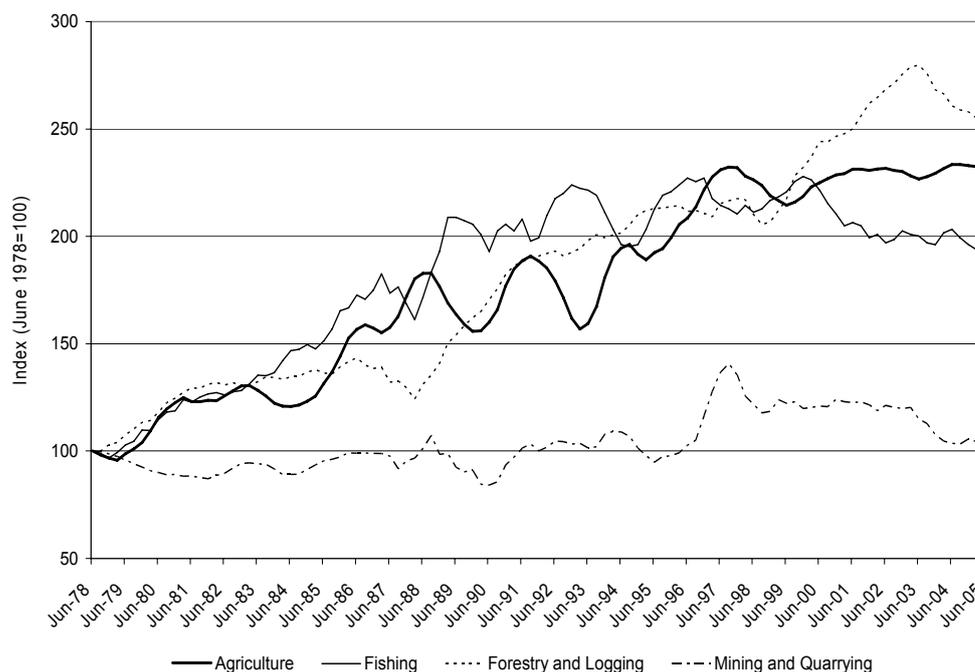
Clearly agriculture is the dominant component of the primary sector; this dominance has increased through the period due to agriculture’s relatively high growth rate. Agriculture’s share of the primary sector has increased from 57% in 1978 to 67% in 2005. This has been at the expense of mining and quarrying, whose share has fallen from 26% to 14%.

The growth performance of the sub-sectors of the primary sector can be seen in Figure 6 below. Forestry and logging in particular performed strongly through the period, with growth surges in the late 1980s and late 1990s relating to favourable commodity prices and exchange rates. Fishing recorded strong, steady growth of around 7% per annum until 1989, after which point real output remained reasonably static. Mining and quarrying is notable for its poor growth performance, with a growth surge in the mid-to-late 1990s saving the sector from having no real growth across a quarter of a century.

Mining’s poor growth performance is despite the sector having significant growth potential. As is described in more detail in Annex Two,<sup>8</sup> it has been estimated that New Zealand has \$86 billion of metallic mineral stocks, but much of this cannot be accessed as it is on land of high conservation value.

<sup>8</sup> See page 38.

**Figure 6 – Primary Sector Real GDP Growth by Sub-Industry**



Source: Statistics New Zealand, GDP by Industry

## Productivity Performance

Looking at output growth of a particular sector tells only part of the story. If, for instance, extra output is the result of subsidies that artificially inflate the value of production, higher growth rates can have negative consequences for the economy as a whole. Likewise, if output growth is solely attributable to increased inputs, growth rates are unlikely to be sustainable. With this in mind, examining the primary sector's productivity performance can provide insights into the sector's performance.

Using an index number approach, Diewert and Lawrence (1999) estimate New Zealand's total factor, labour and capital productivity across the period 1972-1998. The total factor productivity (TFP) performance for the economy as a whole was poor from 1972-1982, reflecting reduced outputs and increased inputs in the economy. After that point, TFP improved through until the end of the period, driven largely by labour productivity increases. Across the total period TFP increased by 0.8% per annum.

Diewert and Lawrence also investigate productivity performance at a sectoral level, though data are presented for a narrower period, 1978-1998, and significant issues with data reliability are highlighted. In that period, segments of the primary sector performed relatively well:

The primary sector's productivity performance has also been strong...

- Agriculture TFP increased relatively steadily, by 3.9% per annum;
- Fishing and hunting TFP increased by 0.3% per annum, but this masks a steady increase to 1987 and a steady decline thereafter;

- Forestry TFP increased by 6.4% per annum, though this appears to be in part attributable to the labour data series used (the reported hours worked almost halved in 1988, which may reflect significant redundancies undertaken in the Forestry Service at the time).

Using a broadly similar index number methodology,<sup>9</sup> Black, Guy and McLellan (2003) examine New Zealand's productivity performance over the period 1988-2002. They find that New Zealand's multifactor productivity growth increased significantly after 1993, from 0.1% per annum for the period 1988-93, to 1.3% per annum 1993-02. The biggest contributors to this increase came from transport and communications (6.8% 1988-93 and 5.5% 1993-02) and the primary sector (-0.5% 1988-93 and 2.5% 1993-02). While this paints an impressive picture of the primary sector's relative performance, data limitations temper the results. As the authors point out, the analysis uses data on labour and capital as inputs to production but does not include any measure of land use or natural resource depletion, factors that would be of particular importance to the primary sector.

... though there are some data limitations.

Data on agriculture and forestry and logging productivity, maintained by the Ministry of Agriculture and Forestry, are consistent with the story above.<sup>10</sup> Figure 7 shows the TFP of these sectors for the period 1972-2003.

**Figure 7 – Total Factor Productivity**



Source: Ministry of Agriculture and Forestry

<sup>9</sup> The similarities and differences in approaches, data and results are outlined in Black et al (2003) on pp. 11-12.

<sup>10</sup> Black et al (2003) report average multifactor productivity growth over the period 1998-2002 for the primary sector as 1.4%. Ministry of Agriculture and Forestry data on agriculture and forestry and logging, two of the component parts of the primary sector, show growth across that period of 1.9% and 1.4% respectively.

Research and development, innovation and economies of scale have driven primary sector productivity.

TFP in agriculture increased by 2.6% per annum across the period. TFP in forestry and logging was slightly better at 2.8% per annum. As Figure 7 shows, a key factor in forestry and logging's TFP performance is the rapid growth over the period 1985-1991 (13.8% per annum), which may be attributable to significant changes in the forestry labour force.

The relatively high productivity growth in the primary sector has been driven by research and development (coming up with new ideas), innovation (practical application of those new ideas) and economies of scale. These factors are described in more detail in Annex One as they apply to particular parts of the primary sector.

New Zealand's spending on research and development is relatively low compared with other countries. However, the bulk of the primary sector's production is in large-scale, homogeneous products such as milk, so research and development investment in this sector tends to be widely applied across a large volume of products and/or processes. As a result it can have a large effect for a small investment.

The government invests in public research and development to address potential market failures around knowledge creation and diffusion. Public research and development is carried out largely by Crown Research Institutes (CRIs) and universities (with Massey and Lincoln being of particular importance for the primary sector). A contestable funding model is used for much CRI funding, with the aim of ensuring that science investment is aligned with government priorities. The Foundation for Research, Science and Technology, a Crown Entity, receives funding from the Crown for science priorities, and science providers compete for funding through tender rounds. This underlying research and development infrastructure has been a key support for primary industries.

## Prospects for the Primary Sector

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As a small nation with a limited domestic market, New Zealand relies heavily on international trade for the sale of its primary sector products. Accordingly, changes in international demand for and supply of primary sector products, along with changes in trade barriers, will play a critical role in determining the future growth of New Zealand's primary sector.

Some of the trends that we could expect to see over the next decade include:

Liberalisation of international trade would have significant positive effects.

- i *Gradual but continued progress in trade liberalisation.* Following recently concluded agreements with Thailand, Singapore, Chile and Brunei, New Zealand is negotiating free trade agreements with China, Malaysia and ASEAN, which are expected to have a positive impact on the primary sector. The progress made in the Doha round<sup>11</sup> of trade liberalisation discussions in 2004 is also expected to have significant benefits for our primary sector, though subsequent progress has been slow. The magnitude and timing of changes to countries' agricultural protection are still to be determined, so it is difficult to assess the size or timing of the impact on New Zealand. However, modelling by Rae and Strutt (2004) suggests that a scenario based on various proposals and texts presented during the WTO Round could lead to annual gains of around 0.6% of GDP;<sup>12</sup>
- ii *Strong demand for New Zealand's agricultural exports.* The demand for beef, sheep and dairy products is expected to increase as developing countries continue to grow and require protein. The continued emergence of developing countries' middle classes, with associated urbanisation and Westernisation of diets, should bolster demand for products including meat and cheese. Within developed countries, changes in consumer preferences should continue a relative shift away from red meat and butter and towards poultry and cheese. In combination, these two trends would provide a growing market for the primary sector's commodities and opportunities to develop markets in higher-end specialist products;<sup>13</sup>
- iii *Increased supply of most agricultural products.* The increasing world demand for agricultural products mentioned above is expected to be met by an expansion of world supply, much of which is expected to come from developing countries. New Zealand producers will remain price takers in world markets and subject to ongoing competition;
- iv *Climate change obligations to pose increasing costs.* The primary sector plays a critical role in New Zealand's greenhouse gas emissions profile, with agriculture being a major emitter and forestry providing significant absorptive capacity. Our emissions obligations are likely to be more constraining as time goes on. The international price of greenhouse gas emissions is not being factored into production and investment decisions in the primary sector, as current

International market conditions for our products should be generally favourable.

Our international climate change obligations may present challenges and opportunities for the sector.

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<sup>11</sup> The Doha declaration commits countries to negotiations on market access, domestic support and export subsidies. The declaration called for a reduction of, with a view to phasing out, all forms of export subsidies; substantial improvements in market access; and substantial reductions in trade-distorting domestic support. In the Cancun decision in August 2004, members adopted a framework for negotiations on these three areas.

<sup>12</sup> Rae and Strutt's scenarios and results are set out in detail in sections 3 to 5 of their paper. The scenario leading to ongoing gains of 0.6% of GDP for New Zealand assumes that tariffs up to 55% would be reduced by 36%, with increasingly deeper cuts applying to tariffs greater than 55%. The gains would largely come from terms of trade improvements, with a significant increase in dairy production.

<sup>13</sup> Another trend is the growing influence of animal welfare considerations. For reasons including consumer and societal preferences, many primary producers are instituting auditable codes of welfare for livestock and building this into their marketing. See Ministry of Agriculture and Forestry (2005) for more information.

policy settings – in particular the exemption of methane and nitrous oxide from the carbon tax and the decision not to devolve credits and liabilities associated with forestry – mean that the costs to New Zealand are largely not being passed on to individuals in the primary sector;

- v *Increasing biosecurity risks.* In line with New Zealand's growing global interconnectedness, the threat of biosecurity incursions increases. As recent BSE detection in the United States and Canada has demonstrated, the impact on industry can be severe, and recent changes to New Zealand's biosecurity system demonstrate that this threat is being taken seriously; and
- vi *Short-term exchange rate and commodity price volatility to continue.* There are no signs that the short-term fluctuations in exchange rates and commodity prices, which impact on the profitability of the primary sector, will abate in the near future.

In addition to international conditions, domestic conditions are the other key determinant of future primary sector growth. Clearly, climatic conditions have a major impact on primary sector production. The National Institute of Water and Atmospheric Research (2001) found that the agricultural component of GDP is negatively correlated with the strength of the southerly airflow over the country; that milkfat production is negatively correlated with annual days of soil moisture deficit and regional summer temperature; and that milkfat production is positively correlated with regional spring and summer rainfall. Buckle *et al* (2002) show that climate is an important contributor to the overall business cycle, and that it appears to have been the dominant source of domestic shocks over the period 1984-2002.

Climate is a key driver of primary sector production...

Other domestic factors such as the institutional setting (including the ease with which business can be done, macroeconomic stability and an effective courts system) have an impact, as well as costs of production, processing and distribution (land, labour, capital, energy and transport). Expected trends in domestic conditions include the following factors:

- i The National Institute of Water and Atmospheric Research has suggested that the recent volatility in New Zealand's weather patterns, including three significant droughts since 1997/98, may be indicative of a shift in the Interdecadal Pacific Oscillation (which lasts for 20 to 30 years) to a cool phase, when it is wetter over summer and autumn, leading to fewer days of soil moisture deficit (and therefore better pasture growth). If this is correct, then New Zealand may be moving into a phase of weather more favourable to pastoral production (Ministry of Agriculture and Forestry, 2003b);

... and we may be moving to a phase of weather more favourable for pastoral production.

The primary sector's relationship with the environment will become increasingly important.

- ii The impacts of economic growth on the quality of the environment should become more apparent. This is particularly so in relation to water. With the intensification of dairy, sheep and beef farming, the substantial growth in fertiliser use over the last ten years will have an increasing impact on the quality of water. In addition there will be increasingly competing demand for water: for irrigation, power generation, recreational uses and other purposes;
- iii The cost of energy is expected to continue to increase, reflecting a continuation of increased domestic and international demand, and the carbon tax that will be effective from 2007; and
- iv New Zealand's macroeconomic stability and generally strong institutions are expected to continue to underpin investment and growth in the primary sector.

Overall, the primary sector is expected to continue to perform strongly in the years to come. As New Zealand sells most of its primary products on world markets, we are clearly dependent on shifts in world demand and supply. Despite considerable variation across sub-sectors of the primary sector, overall these international conditions would appear to be favourable in the short-to-medium term.

This is a necessary but not sufficient condition for a strong performance by the primary sector. New Zealand producers must be in a position to exploit the opportunities provided by world markets. We need to be able to receive appropriate price signals from the markets, produce what consumers require and at a competitive cost, and we must be flexible enough to adapt to changing tastes and demand levels.

New Zealand producers have generally met this challenge well. Changes to the way that New Zealand primary sector producers are paid for their production, made largely through the mid-1980s, have exposed them to information on the true value that world markets place on their products.<sup>14</sup> The lack of protection for our primary producers (especially when the protection enjoyed by many overseas producers is considered) gives them sharp incentives to adapt to changing circumstances in product markets. Uncertainty caused by high and volatile inflation through the 1970s and 1980s has been removed. New Zealand producers have used the comparative advantage provided by climate, and have delivered sustained productivity gains – both in production and processing – through innovation, application of new technology and techniques, and consolidation to gain economies of scale.

The primary sector has performed well in the past...

... and should continue to do well in the future...

New Zealand producers should continue to consolidate, to invest in and apply the results of research and development efforts, to make use of

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<sup>14</sup> While price signals to primary sector producers are now much clearer than they were in the early 1980s, they are still not perfect. This is discussed in more detail in relation to red meat in Annex One, and in relation to dairy farming in Annex Two.

innovations – including those presented by biotechnology – and to develop new products to meet market demand.

This is not to say that the way forward is without risks and challenges. International markets can be fickle and conditions can change quickly, though longer-term trends can in some instances be identified and planned for. Exchange rate volatility can erode or inflate the returns that New Zealand producers make. The very real threat of pest incursions and diseases, and the damage that they can cause to our production and our international reputation, mean that the economy must take biosecurity concerns very seriously.

... though a number of key risks will need to be managed.

The tension between economic growth objectives and increasing environmental concerns, particularly with respect to water quality and availability, will need to be addressed so that future production increases are sustainable. The primary sector cannot rely on ever-increasing inputs to production such as fertiliser and water to drive growth. In this area the government can play an important role through clearly defining property rights and developing planning and allocation tools so that competing objectives can be taken into account. Similarly, an effective long-term response to our climate change objectives will require the participation of the primary sector, and the government can help by designing suitable domestic policy settings to encourage this.

## Role for Government

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While the bulk of the work going forward is the responsibility of the firms and individuals that make up the primary sector, there is a role for government in promoting continued primary sector growth:

- i Factors that are good for business generally will be good for the primary sector. The government should:<sup>15</sup>
  - Maintain the country’s strong institutions and stable macroeconomic environment;
  - Clearly define and defend property rights, to provide an encouraging climate and clarity for business investment decisions;
  - Minimise regulatory constraints on business (reducing compliance costs and “red tape”);
  - Encourage the acquisition and maintenance of skills and flexibility in the labour market to drive labour productivity improvements;

The government can help by doing what is good for business generally...

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<sup>15</sup> Each of these factors is discussed in more detail in Treasury (2005).

- Maintain a competitive open economy that exposes our primary sector producers to world price signals and international competition;
- Continue to support research and development that aligns with New Zealand's areas of comparative advantage;
- Ensure that resource allocation mechanisms work efficiently, attribute the full costs of activities, and provide for sustainable use of the country's scarce resources; and
- Ensure adequate investment in infrastructure, including roading, communications and energy;

... managing biosecurity risks and pressing for international trade liberalisation...

- ii The ongoing provision of a robust national biosecurity regime, as outlined in the Biosecurity Strategy, will become increasingly important as our international linkages grow;
- iii The government should continue to press for improved international market access, both through bilateral negotiations and through multilateral mechanisms such as the World Trade Organisation and the Doha round. The potential gains for New Zealand from international trade liberalisation are large, but so is the task of securing those gains; and
- iv Environmental challenges need to be managed strategically. An increasing focus on environmental quality will alter the way that the environment is used as an input to production going forward. The government can provide frameworks for weighing up competing demands and impacts, and incentives for market players to find innovative solutions. Particular areas of interest in the short-to-medium term will include:

...and helping to manage environmental challenges strategically.

- Establishing a framework for considering competing demands for water use, whether that be irrigation, recreation, or cultural values;
- Providing incentives to encourage innovative ways to reduce greenhouse gas emissions to meet the country's climate change commitments; and
- Investigating the trade-offs made in decisions around mining activities, and whether sufficient weight is being given to the potential benefits to the economy of increased mining production.

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# Annex One: Historical Performance Sector-by-Sector

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This Annex presents information on the growth performance of various sub-sectors within the primary sector. The information presented is not exhaustive; instead, it attempts to outline key developments and trends pertinent to an understanding of the primary sector's performance as a whole.

## Red Meat and Wool

### Early History

The New Zealand climate is favourable for beef and sheep farming. In most areas New Zealand has reliable rainfall and moderate temperatures – neither very hot in the summer nor very cold in the winter – which are conducive to near all-year-round pasture growth. This provides New Zealand with a comparative advantage over many (but not all) of its competitors, who need to rely on feed such as grain, and who need to provide shelter for stock during winter months.

Another appeal of beef and sheep farming as an industry to generate foreign exchange after European settlement was that its products were relatively easy to export: before the advent of refrigeration in 1882, the distance between New Zealand and its markets required trade in non-perishables. Wool and hides were ideal, with considerable demand for wool in Britain as an industrial raw material.

With the development of refrigeration, trade in meat emerged as a profitable enterprise. Exports were expanded to carcasses, and a processing industry quickly emerged, with freezing works established close to ports. Farmers selectively bred stock to develop sheep suitable for both meat and wool, and particularly to tap into the lucrative United Kingdom lamb market. Further improvements were made to transport, as early refrigeration techniques were improved upon and made more reliable and faster ships were introduced.

The United Kingdom bought all that New Zealand farmers could produce, through bulk purchase arrangements first used during the First World War and subsequently on the open market. Partly to combat the chaotic state of post-war commodity markets and the market power beginning to be exerted by United Kingdom buyers, the New Zealand Meat Producers' Board (the Meat Board) was established in 1922 and given power to control the export of meat. The Meat Board was also involved with various other market interventions and regulatory functions such as managing the slaughter of stock for meat intended for export and maintaining a minimum price for meat. Export marketing itself was left to the private sector. The Wool Board was established in 1945 and given responsibility for wool promotion and generic research and development to counter the developing threat of synthetic fibres.

New Zealand farmers were helped by the British Empire Economic Conference held in Ottawa in 1932. Amongst other things the conference agreed to set high tariffs for non-British Empire countries, which particularly benefited New Zealand red meat exporters.

Through until the 1950s, farmers were able to capture around 80% of the wholesale price of lamb (Taylor, 1982, referred to in Bollard and Pickford, 1997). Given the profits to be made

through exporting carcasses, there were incentives to simply expand production and little reason to seek to add value through further processing the carcass into premium cuts.

Expansion of red meat and wool production continued through into the middle of the twentieth century. The hill country was developed and initial soil fertility was raised through burn-offs and subsequently through increasing application of fertiliser, with cheap phosphate being sourced from Nauru, and, in a key technological breakthrough, applied through aerial topdressing following World War II. Mechanisation was introduced (e.g. tractors and developments in processing), improvements were made in animal husbandry and economies of scale were exploited.

Attempts at farming in the pumice lands of the central North Island had been frustrated by stock developing a wasting disease known as “bush sickness”. Scientists discovered in 1937 that the disease was due to cobalt deficiency in the soil, which was easily addressed through fertiliser application. This breakthrough opened up significant tracts of land to farming.

### Problems from the 1950s

The favourable market conditions of the late nineteenth century and the first half of the twentieth century were not to last. Through the 1950s and the 1960s the demand for cheap protein in our export markets fell as income rose, and the United Kingdom shifted towards closer economic ties with Europe at the expense of its former colonies. At the same time import prices, including for inputs to production such as machinery, rose. These factors combined to cause balance of payments problems for the country as a whole.

The government response was to encourage exports, including through the diversification of products and markets, and to restrict imports. In 1963 the Agricultural Development Conference was called to try to find ways to accelerate the growth of agricultural exports to alleviate balance of payments problems (Chatterjee and Birks, 2001). It agreed to a major expansion, with targets set for livestock expansion. A number of government interventions to incentivise farmers to expand investment in stock, pasture development and fencing were recommended. These included:

- A development loan programme for pastoral farms through the State Advances Corporation;
- Fertiliser subsidies; and
- Favourable tax treatment, such as the ability to write off capital expenditure on development.

In addition, the Livestock Incentive Scheme and the Land Development Encouragement Loan Scheme were established in 1976 and 1978 respectively. Both schemes were administered by the Rural Banking and Finance Corporation, and offered favourable loan conditions to farmers.

In 1978, the Supplementary Minimum Price scheme was introduced – floor prices were set for beef, sheepmeat, wool and dairy products, and if these prices were not met on the international market, the government topped up farmers’ returns. This was funded through general taxation.

Through these mechanisms and others,<sup>16</sup> farmers were protected from the change in international market conditions. In the absence of price signals to rationalise, production continued at levels that required increasing government subsidies. By 1984, nearly 40% of the average sheep and beef farmer's income came from government subsidies (Federated Farmers, 2002). In the face of other shocks to the New Zealand economy, such as the oil shocks in the early and late 1970s and rampant inflation, this government assistance became increasingly unsustainable.

## Rationalisation in the 1980s

Soon after its election in July 1984, the Labour Government took steps to dismantle the subsidies and regulatory controls affecting the agricultural sector, and the New Zealand economy as a whole.<sup>17</sup> Supports for agriculture were removed early – approximately 30 production subsidies were removed in the November 1984 Budget – and few transitional mechanisms were put in place.<sup>18</sup> The impact of having to adjust to world prices for agricultural products was exacerbated by agriculture's reliance on still-protected manufactured products as inputs to production (Evans *et al*, 1996).

The exposure to clearer price signals provided impetus to diversify products and markets. Not surprisingly, there was a significant rationalisation of stock numbers and processing. Sheep numbers fell from 70.3 million in 1982 to 60.6 million in 1989, a reduction of 14%. This trend continued through the 1990s, with sheep numbers falling below 40 million by 2002 (Statistics New Zealand).<sup>19</sup>

Alongside this decrease in stock numbers was an increase in productivity. Key productivity drivers included advances in breeding and genetics plus the application of better soil and pasture management, which led to higher lambing rates and lamb weights. Farming also experienced increased mechanisation through, for instance, the use of motorbikes, mechanised irrigation and drainage equipment.

In addition, the amount of fertiliser applied to sheep and beef farms increased significantly – over the period 1991-2002, application of fertiliser per hectare increased by between 24% and 28% on intensive sheep and beef units (Parliamentary Commissioner for the Environment, 2004).

## Producer Board Reform

The Producer Board system for meat and wool suffered some well-publicised drawbacks. It lacked incentives for exporters to innovate, blocked out some (potentially innovative) exporters entirely, lacked transparency, imposed high compliance costs on farmers and deterred investment in the industry.<sup>20</sup>

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<sup>16</sup> See Tyler and Lattimore, in Sandrey and Reynolds (1990), particularly pp. 64-68, for more detail on the range of assistance measures that were put in place for agriculture.

<sup>17</sup> See Evans *et al* (1996) for a more detailed description of the reform of the economy from 1984-1995.

<sup>18</sup> The exception was the payment of a one-off exit grant for farmers leaving their farms.

<sup>19</sup> This is not to say that price signals are now perfect. Cattle provide several different products, each with differing demand and supply conditions. Factors such as processing competition, the range of products and the lag time on production can confuse the price signals that farmers receive for different products.

<sup>20</sup> See Jacobsen, Scobie and Duncan (1995) for a description of New Zealand's (then) producer board framework, its history, and consideration of options for reform.

In 1997, the Meat and Wool Boards' legislation was replaced and, in addition to increasing their independence from government and their accountability responsibilities, the new legislation reduced the powers of the Meat and Wool Boards to compulsorily acquire product, organise shipping and set quality standards. The functions of the boards became much more narrowly focused: they were given primary responsibility for promoting and increasing the demand for industry product, conducting or funding research and development, and collecting and publicising industry information. However the Meat Board did reserve some of its centralised authority in an attempt to maximise the capture of quota rents and ensure overseas quality standards were met. The ability to license exporters, regulate the quality of export meat and administer mechanisms for the allocation of access to tariff quota markets were all retained.

The 1997 Meat and Wool Acts also allowed levies to be collected from farmers for use in funding generic promotion, advertising and research and development. However, levy-paying farmers had little or no direct say in how the levy amount was set or what it was spent on. As a consequence, there was a lack of confidence that levy funds were well targeted. In addition, there was increasing dissatisfaction with the performance of the boards on the part of farmers who were suffering from low returns. Further reform was needed.

The government accepted recommendations that specialist non-trading board legislation be replaced by generic legislation, and that statutory producer board levies be replaced with generic levy mechanisms, such as those under the Commodity Levies Act 1990 (CLA). It was advised that the commercial activities previously carried out by the boards should be divested to commercial organisations operating with commercial incentives. These measures were aimed at achieving the best use of farmers' capital with better targeting and accountability for levy funding.

The industries were almost unanimous in their support for reform and fully endorsed the passing of the Wool Industry Restructuring Act in July 2003 and the Meat Board Act in June 2004, which enabled the industries to merge their levying and industry-good functions under the CLA. As part of this process, the Wool Board was completely disestablished, while the Meat Board was retained with a much-reduced function, principally to manage meat export quota allocation.

The "industry-good" body formed in the merger, Meat and Wool New Zealand Limited, is a limited liability company established under the Companies Act 1993 with its levying powers under the CLA subject to the standard six-yearly farmer support referenda.<sup>21</sup> The new, shared institutional structures of the meat and wool industries are designed to enhance the industries' international competitiveness by enabling the industries to benefit from greater synergies and cost efficiencies and the improved accountability provisions of the CLA.

## Dairy Farming

### Early Development of the Industry

New Zealand's temperate climate has provided the dairy industry with a comparative advantage over many of its competitors since its inception in the late nineteenth century. New Zealand dairying's costs of production are relatively low due to the ability to feed on grass all-year-round and the absence of a need for winter housing of stock. (A downside of grass feeding is a

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<sup>21</sup> Industry good activities are in the areas of research and development, information transfer, market development, trade policy, skills and education, and issues management.

resultant seasonal variation in milk production that requires greater investment in milk processing facilities to accommodate the peak.)

Dairy farming first commenced in New Zealand to meet domestic consumption needs. The introduction of refrigeration in 1882 provided the opportunity to expand production and export butter and cheese to overseas markets, though initially the supply of refrigerated transport was largely filled by frozen meat. The main destination for New Zealand's dairy exports was the United Kingdom. Production gradually expanded as suitable stock, land, processing facilities, processing workforce and transport infrastructure were developed. The range of products being exported expanded beyond butter and cheese to include casein and milk powder.

Steady increases in productivity were brought about through improvements in pasture and stock management, selective breeding, technical innovations, and increases in the product mix to use more of the raw product. Key advances included:

- The Babcock test for determining the percentage of butterfat in milk (1890) – this discouraged the practice of watering down milk, and allowed farmers to be rewarded on the basis of the butterfat content of their milk, which promoted the development of higher-butterfat breeds and strains;
- The introduction of milking machines (first introduced in the 1890s and milking half the national herd by the 1920s (Hawke, 1985));
- The application of cobalt to central North Island pasture to address “bush sickness” from the 1930s;
- The use of aerial topdressing following World War II;
- The use of artificial insemination from the 1950s onwards, and
- The introduction of milk tankers in the 1960s, which had a dramatic effect as it made it much easier to transport whole milk to factories. This brought economies of scale and a broader product range.

As an illustration of the gains in on-farm productivity achieved, from 1936 to 1993 there was a 20% increase in cow numbers but an 80% increase in milk produced (Bollard and Pickford, 1998).

### Developments from the 1950s

The decision of the United Kingdom to more closely align its economy with Europe adversely affected New Zealand dairy, and the government's response to these changed international conditions was as outlined above for red meat and wool. The increasingly unsustainable protection measures that were introduced were removed in the mid-1980s, and the sector was exposed to market signals about the value of its products. Unlike red meat and wool, however, increasing world demand and commodity price fluctuations led to much better prices for dairy products in the 1980s. As a result, production rose significantly through the mid-1990s, and this trend is continuing, buoyed by gains through the Uruguay round of the GATT trade liberalisation talks in the 1990s and prospects of further gains to come through the Doha round.

The industry has continued to take advantage of economies of scale and scope. Amalgamations of farming units have continued through the 1980s and 1990s. Comparing

figures from 1981/82 to 2001/02, the number of herds has fallen by 14% to 13,649, but the average herd size has increased by 108% to 271. The average number of cows per hectare has increased by 27% over this period, to 2.67 cows per hectare (Ministry of Agriculture and Forestry, 2003a).

This period of intensification can also be seen in statistics on fertiliser use: in the period 1991-2002, the amount of urea fertiliser per hectare applied to dairy rose by 162% (Parliamentary Commissioner for the Environment, 2004). This has been driven by the need to compete on price in international commodity markets with the resultant drive for efficiency, combined with the relatively low price of nitrogen fertilisers.

Dairy farming and processing has increasingly become a high-tech industry and is taking on much more of a corporate character. There is increasing mechanisation on the farm: examples include farm bikes, mechanised irrigation, milking machines, rotary cowsheds, the use of computers to plan fertiliser application and feeding and to track stock health, and technology behind breeding and pasture development. This mechanisation extends through to the highly mechanised processing facilities.

## The Dairy Board

The government made efforts to coordinate New Zealand dairy exports from the 1920s, beginning with the Dairy Export Produce Control Board in 1923, which had a focus on international marketing. The New Zealand Dairy Board (the Dairy Board) was established as a single desk exporter in 1961 to co-ordinate overseas sales of dairy produce from a large number of small co-operatives serving local collection areas. Sinclair (1999) explains the rationale for establishing New Zealand's producer boards, which can be briefly summarised as helping to coordinate exports (both in terms of synchronising producer flows to match demand and transport requirements, and avoiding New Zealand producers competing with one another on the international market) and to concentrate New Zealand producers' market power to combat the purchasing power of large buyers in Britain.

From 1961 when there were 168 dairy companies operating under the Dairy Board, the industry underwent an extensive period of consolidation throughout the 1970s, 1980s and 1990s. By 1981 there were 42 dairy companies operating in New Zealand, in 1998 there were nine, reducing to four in 2001. It was this period of consolidation that provided the impetus for sector reform; forty years of restructuring had rendered the traditional functions and powers of the Dairy Board essentially irrelevant. The three major dairy processors remaining at the end of this period had objectives that frequently differed markedly from those of the Dairy Board. The legislation existing prior to 2001 did not adequately address governance issues, impeded access to capital, provided little scope for innovation and imposed multiple, often conflicting objectives on the Dairy Board. In effect, the industry had outgrown its governing legislation, and instead of a solution it had now become a problem in itself, impeding the ability of the industry to adjust and compete in a constantly evolving international market.

In 2001, in response to very strong industry support, Kiwi Co-operative Dairies Limited and New Zealand Dairy Group merged with the New Zealand Dairy Board to form Fonterra Co-operative Dairy Company Limited (Fonterra). Fonterra holds a dominant position in the dairy industry, processing approximately 95% of total New Zealand milk supply, with the majority of the rest

going to Westland<sup>22</sup> (3%) and Tatura<sup>23</sup> (1%), two independent processors that chose not to join the merger.

The government agreed to facilitate the merger. The Dairy Industry Restructuring Act 2001 (DIRA) allowed the creation of Fonterra as the dominant industry processor conditional on measures to ensure contestability in both dairy processing and the market for farmers' milk, open entry and exit of farmers from the co-operative, and competition in the domestic market for dairy products. The Dairy Board's statutory powers as an export monopoly were removed, allowing any entity to export dairy products from New Zealand.<sup>24</sup> The main objectives of the DIRA were to:

- Maximise the industry's economic performance by allowing it to evolve in response to the market;
- Remove the constraints on industry performance from the existing legislation (e.g. the Dairy Board's export monopoly);
- Facilitate the emergence of competition and new strategies;
- Limit the potential for adverse effects from monopoly power;
- Minimise regulatory and compliance costs; and
- Increase New Zealand's strength in international markets in the face of large overseas conglomerates.

## Fishing

Prior to the early 1960s, the New Zealand fishing industry was largely limited to a small number of high-value inshore species such as crayfish, with only one-quarter of the catch being exported (Bollard and Pickford, 1998). In 1963 the government started offering incentives for the industry to expand, in the form of subsidised loans for fishing and processing, and inexpensive access to fishing grounds.

Expansion was given a boost in 1978 with the establishment of New Zealand's Exclusive Economic Zone (EEZ) under the United Nations Convention on the Law of the Sea, and the Territorial Sea and Exclusive Economic Zone Act, which saw New Zealand's waters extended from 12 to 200 nautical miles. The government facilitated joint ventures between local and foreign industry, with these joint ventures leading to a rapid expansion of deep-sea fishing.

Government assistance, motivated largely to encourage New Zealand fishers into deep-sea operations, continued up until the early 1980s. New offshore fisheries grew, particularly through joint ventures. However, government assistance also encouraged more effort in inshore fisheries. This began to cause sustainability problems for many stocks (such as snapper and tarakihi), and this eventually led to the introduction of the Quota Management System (QMS) in 1986.

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<sup>22</sup> Westland Co-operative Dairy Company Limited.

<sup>23</sup> Tatura Co-operative Dairy Company Limited.

<sup>24</sup> Note that the export to some designated tariff rate quota markets was assigned exclusively to Fonterra for transitional periods expiring between 2007 and 2010.

Under the QMS a Total Allowable Catch (TAC) is set each year for each stock, based on information on the biological state of the stock. Allowances for customary and recreational catch are made from within the TAC, leaving the Total Allowable Commercial Catch (TACC) for commercial fishers. The TACC is managed through an Individual Transferable Quota system involving perpetual property rights that can be bought and sold.

The QMS provides the Crown with a strong management tool to ensure sustainability of fisheries. If the health of a species is threatened, the TACC can be adjusted downwards, and fishers' entitlement to catch is reduced accordingly. The QMS also provides much greater certainty for fishers about their property rights. Fishers are allowed to take their catch at any time during the year, reducing the "race to fish", and the resulting overcapitalisation, that can occur when there are less well-defined property rights. The combination of a perpetual tradable property right and sustainable stocks also allows fishers to plan their business over the long-term, which encourages investment.

Since the introduction of the QMS, the fishing industry has grown in absolute size and the number of companies has reduced (within the limits on quota aggregation set under the Fisheries Act<sup>25</sup>). This has allowed economies of scale to be exploited, including through the use of larger vessels in the deep-sea fleet, many of which have processing facilities onboard. The main players in the New Zealand fishing industry are Sealord, Sanford, Talley/AMALTAL, Vela, Moana Pacific, and the members of the Seafood Industry Consortium. (SeaFIC, 2005).

The 1990s saw the development of a number of new and high value fisheries, most notably scampi and the expansion of tuna. Also in evidence has been the continuation of sustainability problems in some key stocks, such as orange roughy and hoki, which have been addressed through reductions in TAC levels with resultant impacts upon the industry. The 1990s also saw the introduction of cost recovery, whereby quota holders are charged levies to contribute to the costs of Crown management of the QMS, particularly scientific research activities.

Other trends from the 1990s include a growing focus on the environmental impacts of fishing, for instance the incidence of seabird bycatch; development of aquaculture and the farming of shellfish such as mussels, which is discussed more in Annex Two; and increasing Māori influence in the industry through, for instance, the 1992 fisheries settlement.

## Horticulture

Horticultural production in New Zealand has a long history. Māori produced crops such as kumara for subsistence and trading purposes, and with European arrival, this production increased. Production benefited from the natural fertility of the land, and the productivity of horticulture improved, aided by mechanisation of processes for sowing and harvesting

Crops such as apples and pears were developed, and there was a considerable market for this produce in the United Kingdom. Horticultural production spread particularly in the 1970s and 1980s, with the development and commercialisation of the Hayward kiwifruit variety, the introduction of berries, and the expansion of citrus. Sales were expanded into North America and the European Union.

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<sup>25</sup> For the main commercial offshore species (e.g. hoki, orange roughy), a fisher is allowed to hold up to 45% of Individual Transferable Quota in each quota management area. The limit for rock lobster is 10%, and the limit for other inshore stocks is set at 20%.

New Zealand has been producing wine since the mid-nineteenth century, though production volumes and quality have increased significantly from the 1970s. Wine exports have grown, particularly focused on the Sauvignon Blanc variety, with around half of these exports going to the United Kingdom. By 2003/04 wine exports were earning around \$300 million per annum, or 14% of horticultural export revenue. These exports represented around 25% of total New Zealand production; the remaining 75% is consumed by the domestic market.

In a similar way to dairy and meat, exporting activities for horticulture have traditionally been organised through marketing boards with monopoly power, to coordinate activity and exert power as a seller on international markets. The key horticultural producer boards have been the New Zealand Apple and Pear Marketing Board and the New Zealand Kiwifruit Marketing Board.

As part of the producer board reforms in the late 1990s and early 2000s, the Apple and Pear Marketing Board was restructured into an independent regulatory board and a company (ENZA). The board has subsequently been abolished, and ENZA has merged with the Turners and Growers group.

The Kiwifruit Marketing Board was restructured in the late 1990s into an independent regulatory board and a company (Zespri). Under the Kiwifruit Export Regulations 1999, Zespri has a monopoly over kiwifruit exports, and the Board's role is confined to regulatory functions and enforcing non-diversification rules (ensuring that Zespri keeps to its core business of buying New Zealand-grown kiwifruit for export).

Stiff competition on international markets and reasonably static prices have provided the impetus for innovation in horticulture, particularly in developing new strains of product. Research and development effort has led to the introduction of a range of new varieties recently: apples such as Pacific Rose and Jazz, and the new Zespri Gold kiwifruit. These market conditions have also led producers to find other ways of competing – on product quality through strict quality control, through developing temperature and humidity controlled environments to ensure a consistent quality product throughout the year.

## Forestry

When Europeans arrived in New Zealand, much of the country was covered in native forest. This is despite clearance of significant amounts of forest by Māori through hunting activities. Europeans continued the deforestation trend, both to use the wood for house and shipbuilding and to clear land for farming purposes.

It was recognised as early as the 1870s that the amount of wood produced from these clearances was unsustainable, and the government took steps to reduce deforestation and create plantation forests. Initial efforts were largely ineffectual, but this changed with the creation of the State Forest Service in 1919. Large-scale government planting took place in the 1920s and early 1930s, predominantly of *pinus radiata*, a species imported from California.

Much of the afforestation of the 1920s and 1930s took place on the pumice lands of the central North Island, which had been found to be unsuitable for agriculture due to stock developing “bush sickness”. With the discovery of a cobalt fix for this problem in 1937, this land became suitable for farming, and large-scale afforestation ceased.

The government kick-started planting again in the 1960s, with the wider aim of expanding and diversifying New Zealand's export production. Expansion was driven both by Forest Service

planting, and by both direct and indirect financial incentives for private planting. Planting took place on increasingly marginal land, with planting decisions influenced by a range of factors other than profits, including regional employment, Māori economic development and land stabilisation.

Forestry exports expanded through the 1960s with increasing sales of logs to Japan, plus pulp and paper to Australia and the Pacific. Financial incentives for planting remained in place until the mid-1980s, by which time the size of the plantation estate had tripled, from 352,000 hectares in 1960 to over one million hectares in 1984 (Rhodes and Novis, 2002).

The government took steps in the late 1970s to manage and protect native forests on public land, with this approach extended to private land in 1989. Under the Forests Act there are restrictions on the felling, milling and export of native forests.

Forestry did not escape the wider economic reform that took place in the mid-1980s. The financial incentives for private sector planting ceased, and changes were made to how forestry was taxed. The Forest Service was split up; commercial forests were largely corporatised and then sold through the late 1980s and early 1990s. The management of native forests became the responsibility of the Department of Conservation.

The forest industry has seen significant plantings since 1990, responding to wood commodity price movements and the declining returns from other uses of the land. However in the last few years, a combination of increased international competition, low commodity prices, an unfavourable exchange rate and increasing transport costs have stifled growth.

There have been important new technologies applied in forestry – mechanisation in harvesting and processing leading to reduced labour requirements, improved breeding stock for trees, and improvements in forest management, including forest health and fertiliser application.

New Zealand remains a price-taker on the international market for forestry products, and is vulnerable to commodity price and exchange rate fluctuations. The industry is dominated by radiata pine, which has advantages as a species (it is very fast growing and it is suitable to our climate) and disadvantages (it is not as reliable as a building material when compared with some other woods). Some attempts are being made to diversify into other species and into more processed products.

## Mining

Mining was an extremely important early industry for New Zealand, with coal and metals, particularly gold, being mined from 1850 onwards. Sizeable coal deposits were found on the West Coast and in the Waikato. Discoveries of gold deposits in Otago, the West Coast and the Coromandel led to gold rushes with associated large-scale immigration to New Zealand throughout the second half of the nineteenth century.

Mining also played a key role in the economic development of the country from an early stage by providing inputs to other production – for instance aggregates for roads, limestone for fertiliser, and coal for fuel. Production fluctuated throughout the nineteenth and twentieth centuries, based on discoveries of deposits and the development of new extraction and processing techniques.

New Zealand has extracted petroleum from the mid-nineteenth century, though serious production did not begin before the 1960s with the discovery of gas condensate fields in the Taranaki Basin at Kapuni (1959) and Maui (1969). While several other fields have been discovered and brought into production, Maui and Kapuni provide the bulk of New Zealand's oil and gas production. Total gas and oil production has fallen since a peak in the late 1990s, largely as a function of reduced output from Maui. At the start of 2004, it was estimated that Maui and Kapuni had used about 86% of their reserves (Ministry of Economic Development, 2005).

As was seen above, mining production has been growing slowly in recent decades: an average annual growth rate of only 0.1% over the period 1978-2005. Included in this performance were periods of rapid growth in the early- and mid-1990s as a result of increased exploration investment in the 1980s. Following this, overall mining output has reduced. This masks differing performances within mining: for instance, over the period 1996-2001, gold production decreased by 15%, whereas coal production increased by 8%.

Key constraints on the mining sector in recent years have been the lack of sustained and large-scale investment in exploration, access issues, the increasingly large-scale and capital-intensive nature of mining, and environmental constraints. The Resource Management Act, through the resource consent process, has made firms more accountable for any environmental impacts that may result from their mining operations. According to Crown Minerals, the international mining industry views New Zealand as prospective, but seems to have negative perceptions about some of New Zealand's policies, especially around land availability and environmental management.

Mining output contributes around \$1.1 billion (1995/96 prices) per annum to New Zealand's Gross Domestic Product, made up of aggregates, metals, industrial minerals, petroleum and coal. The bulk of production comes from Taranaki, Waikato, the West Coast and Otago. New Zealand has an in-ground coal resource of 15.5 billion tonnes, of which 55% is considered to be recoverable, large metallic mineral stocks, and large resources, though not well quantified, of non-metallic minerals and aggregates.

# Annex Two: Prospects Sector-by-Sector

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## Red Meat and Wool

The future for red meat appears positive, though there are several risks that will need to be taken account of going forward.

In terms of international market conditions, the first thing to note is the growing world demand for meat products as developing countries' incomes rise and tastes change. This trend is expected to continue into the foreseeable future. Strong lamb prices are expected to continue as world demand for lamb increases and production (including in New Zealand) is expected to decrease. Generally weaker beef prices are expected as production increases to match demand, but the enduring effects of recent outbreaks of BSE in the United States and Canada are difficult to assess.

In 2001, the world average agricultural tariff was 62%, and the average tariff for meat products ranged from 75% to 91% across different meat products (World Bank, 2004). Significant opportunities to reduce these trade barriers are offered by both the Doha round of trade liberalisation talks, and the bilateral free trade agreements that New Zealand is discussing with several countries at present. While progress in achieving reductions in trade barriers has generally been slow, the current Doha round remains the country's top trade policy focus.

Turning to the productivity of New Zealand beef and sheepmeat production, the consistent improvements in both on-farm and processing efficiency experienced over recent decades are expected to continue as new technological advances are applied. For instance, the significant increases in lambing rates and lamb weights as a result of selective breeding and feed improvements should continue as the benefits from recent genetic enhancement techniques become more widely applicable. Economies of scale in farm units and processing facilities will continue to be explored, as will mechanisation opportunities in processing.

The shifts towards exporting higher-grade cuts of meat and chilled rather than frozen meat to meet changing international market tastes have both improved returns. As world incomes continue to rise, opportunities to continue these developments will exist.

Despite these positive trends going forward, a number of threats to the continued prosperity of beef and sheepmeat will need to be managed. Clearly, the sector will continue to be vulnerable to biosecurity risks such as foot and mouth disease. Significant government investment in biosecurity generally, and in addressing specific threats including foot and mouth disease, will allay but not dispose of these concerns.

Beef and sheepmeat will also continue to be vulnerable to short-term commodity price and exchange rate fluctuations, and the interrelationship between overseas beef and dairy market conditions. Most world consumption of beef and sheepmeat is met from a domestic source, so the export market can act as a release valve with considerable variation in prices.

Having grass-fed stock, while providing a comparative cost advantage over many of New Zealand's overseas competitors, leads to seasonal fluctuations in production. Accordingly, meat processors need to have capacity to meet the peak production requirements, and therefore they carry excess capacity for the rest of the year. This can lead to considerable

competition in the quieter periods. Competition policy considerations limit options for addressing overcapitalisation.

There are some barriers to exit from meat processing – for instance the redundancy costs of closure. Because of this, there can be incentives for firms that are not profitable to wait for other competitors to exit in order to enjoy the benefit of the dispersal of the stock that firm processes. Hence, processing may not adjust to changes in market conditions as rapidly as might be desirable from an efficiency perspective.

As is discussed above, agriculture plays an important role in New Zealand's climate change position, but the costs of agricultural greenhouse gas emissions are largely not being passed on to the sector. How agriculture is factored into New Zealand's response to climate change issues in future years is unclear, but if production and investment decisions are to take the international price of greenhouse gas emissions into account, agriculture will need to receive appropriate signals and incentives.

Environmental concerns are likely to play a greater role in the future, particularly relating to access to water for irrigation and effluent/chemical run-off concerns. While significant increases in fertiliser application have increased production over the last fifteen years, water quality issues may well speed the shift to more sustainable fertiliser use.

Turning to wool, New Zealand is a significant player in the international wool market, particularly in the coarse wool segment of the market. There has been a long-term decline in wool volumes and inflation-adjusted prices, due largely to the impact of synthetic fibres from the middle of the twentieth century onwards. These trends are expected to continue.

If prices are to remain static or declining, the profitability of the wool industry will lie in reducing costs and producing and processing wool more efficiently. Potential improvements in labour productivity may come through the use of more capital or through innovations in processing.

Another option for New Zealand wool producers that has proven successful for some companies already is a shift to higher-end products, either away from producing coarser wool used in carpets towards finer wool used in designer clothing, or towards alternative end-uses for strong wool, such as in healthcare products. Such moves may provide opportunities for improved margins.

As wool is a by-product of sheepmeat production (except in the case of fine wool), similar land and water use issues as outlined above apply to wool production.

## Dairy Farming

Generally, the prospects for dairying look positive although this is not to say that the outlook is without risks.

World demand for dairy products is expected to steadily increase, partially in a response to the westernisation of tastes, although international supply is expected to increase also. For example, there is a concerted effort to increase Chinese production to meet domestic demand – growth in output of 6% per annum is expected as barriers affecting genetics, feeding management and processing are addressed (OECD, 2004).

It is expected that New Zealand's dairy productivity and efficiency will continue to increase, both in terms of on-farm activities and in processing systems. This is likely to result from a variety of

sources such as the research and development effort currently being expended in dairy and dairy-related activities, ongoing genetic improvements and continuing increases in herd and farm size.

There are, however, a series of risks that the dairy industry faces, and these risks will require ongoing careful management for the dairy industry to continue to contribute fully to New Zealand's ongoing economic performance.

In particular, the dairy industry is vulnerable to biosecurity risks, and to breakdowns in world trade negotiations. There is a gradual liberalisation of barriers to trade in dairy products,<sup>26</sup> and the Doha round suggests this will continue, but a reversal of this trend would have significant consequences. New Zealand exports the vast majority of the milk products it produces so our reliance on ongoing access to export markets is critical.

Fonterra is the world's largest dairy exporter. Fonterra is the dominant player in the New Zealand dairy industry, and there is a heavy reliance on Fonterra's ongoing performance.<sup>27</sup> This applies at all levels of its processing and marketing functions, as well as Fonterra's ongoing relationship with its shareholders.

Although large in terms of export volumes, Fonterra is by no means the world's largest dairy company. Often, domestic producers meet much of the consumption need in foreign countries so New Zealand becomes a price-taker. This is particularly the case for commodity products, but less so when Fonterra is able to differentiate its products on a quality basis.

Issues for Fonterra exist domestically as well as internationally. An example of an issue that Fonterra faces relates to the way in which price signals to shareholders are structured. Currently, shareholders' returns from Fonterra take the form of a payout based on production levels. This price signal provides shareholders with incentives to increase the volume of milk and milk solids supplied. Depending, however, on the relative value of commodity milk versus various value-added activities in the future, the 'bundling' implicit in the price signal has the potential to distort signals as to the relative value of various investments through the sector.

Though increasing the size of dairy farms and herds has been a very effective way of increasing efficiency, this is leading to concerns about the barrier faced by new entrants to the industry. It is becoming increasingly expensive to purchase an economic dairying unit, or for people entering the industry as sharemilkers to purchase requisite stock. The average age of dairy farmers is around 55 and has been increasing, which may lead to succession problems when an increasingly large cohort of farmers looks to retire. Thought is being given within the industry to ways of addressing barriers to entry, such as by altering the traditional 50:50 sharemilking arrangement to make it less expensive to enter, or by focusing on other factors that can make a difference to successful entry into the industry – for instance training systems and HR support. In the last few years there have been some shifts away from the family farm regime towards a more corporate form of ownership, including equity partnerships.

In addition to the climate change issues for agriculture outlined above, environmental concerns are likely to become more prominent in the future. The most obvious of these are water-related, both in terms of access to water to support farm production systems, and issues related to run-

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<sup>26</sup> The average tariff for dairy products in 2001 was 86% - World Bank (2004).

<sup>27</sup> This does not present problems when Fonterra's performance is strong, but it raises "all the eggs in one basket" and "too big to fail" risks for the economy.

off of effluent or chemicals.<sup>28</sup> These concerns are often specific to particular regions, and an ongoing challenge will be to ensure the efficient allocation and use of available water, and to ensure that the effects of run-off are mitigated as effectively as possible. On the latter, efforts are already underway to develop technologies to address these issues, for instance through the development of nitrate inhibitors.

## Fishing

New Zealand's seafood exports fell in value from \$1.5 billion in 2002 to \$1.1 billion in 2004, almost exclusively due to shifts in the New Zealand dollar against the US dollar. This demonstrates the sector's short-term vulnerability to factors outside its control. One of the main challenges that the industry will face going forward is to increase the value of its products in the face of these uncertainties.

The issues that will impact on the growth of wild fisheries are somewhat different from those facing aquaculture. These are outlined separately below.

### Wild Fisheries

The QMS is used to manage the vast majority, by value and tonnage, of New Zealand's commercial fish stocks. The QMS aims to allow for the maximum utilisation of fisheries resources consistent with sustainability. The TACC caps the quantity of fish from each particular species that can be caught commercially each year. In this sense, to the extent that fish stocks are being caught at the TACC (which is largely the case for the commercially important stocks), there is little scope for growth simply through increasing catch.

Markets often place a premium on fresh, unprocessed fish. Nevertheless, there are still several avenues to pursue growth, including investigating the potential commercial value of new stocks, improving harvesting methods, reducing waste in the production process, increasing economies of scale, and increasing the value of fisheries exports through smart processing and more effective marketing.

Key issues likely to impact on the future growth of the industry include:

- i *International demand for and supply of fish.* As is the case for meat and dairy products, as world incomes increase and consumer preferences change, demand for fish products will continue to increase. The emergence of the Chinese 'new middle class', which is around 120 million people, will provide a growing market for New Zealand fish products over the next few years. Increases in the world supply of fish are increasingly being met through expansion of aquaculture, as many wild fish stocks are currently being fished at or above sustainable catches;
- ii *Trade barriers.* New Zealand faces a variety of trade barriers in world fisheries markets. These include tariffs, quotas, licensing, and government financial transfers. Transfers were equal to 20% of the recorded landed value of catch in 1999 (OECD, 2003). In 2003 the trade-weighted applied tariff average of OECD countries was 3.1% (OECD, 2003), which is a reduction from previous levels. However, tariff escalation also applies: the average tariff for unprocessed fish was 2.5% versus 6.3% for processed products,

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<sup>28</sup> Application of increasingly large amounts of urea fertiliser from the start of the 1990s, plus increasing numbers of stock, both absolute and by herd, has led to problems with run-off of effluent and chemicals polluting waterways.

making it more difficult for the New Zealand seafood industry to move into higher value-added exports. In China, a key emerging market that took around \$80 million of New Zealand seafood exports in 2003, tariffs on fish are around 10%. The Ministry of Foreign Affairs and Trade continues to work with the local industry and with overseas governments to improve trade access;

- iii *Increasing focus on the environmental impacts of fishing.* Two recent examples have highlighted the growing focus on the environmental impacts of fishing: the national and international concern about the effects of bottom trawling on underwater seamounts, and the impact of squid fishing on seabird mortality. Managing these and other impacts will be a challenge for the industry; there are opportunities to address these impacts through changes in catch methods and the development of new technology;
- iv *Lack of industry cohesion.* Despite an enduring trend toward consolidation of the New Zealand fishing industry (which we would expect to continue), the industry is not particularly cohesive. This may be partly culture-driven (with fishers often characterised as rugged individuals), and it may be that the industry's vertically integrated structure complicates collective action. The Seafood Industry Council (SeaFIC) has recently undertaken some work to encourage collective action in the industry, and published "The Toolbox – 12 building blocks to success". The approach is being piloted in six applications across the industry;
- v *Poaching of high-value fisheries expected to continue.* The targeting by poachers of species such as paua and rock lobster over a long period has led to serious sustainability concerns. As an example of the scale of the problem, it is estimated that the amount of paua poached each year is equal to the TACC. While the Ministry of Fisheries will work to reduce poaching, the economic incentives for poaching are likely to remain, and this will continue to place a burden on the affected fisheries;
- vi *Opportunities to expand research and development efforts.* Research into the health benefits of fish has highlighted the positive impact that omega-3 fatty acid can have: it reduces blood clotting, thereby reducing cardiovascular problems (Kris-Etherton *et al*, 2002). Opportunities exist to further investigate the non-food dimensions of fish products and to develop markets for nutraceuticals leveraging off these health benefits; and
- vii *Tension between commercial and non-commercial fishers.* Recent increases in recreational fishing in some stocks have required reductions in the amount of catch taken by commercial fishers. Tools to manage recreational fishing effort such as bag limits and minimum size requirements are blunter than the controls on commercial catch. Commercial fishers have called for non-commercial catch to be more effectively controlled to prevent their catch rights being eroded; these calls will increase if, as expected, recreational catch continues to increase.

## Aquaculture

The New Zealand aquaculture industry generates sales of around \$285 million per annum, with \$184 million of this exported (Moore *et al*, 2004). The performance of the industry has been attributed both to comparative advantage derived from natural resource endowment, and to the creation and application of innovation. Worldwide, aquaculture is a thriving commercial activity, growing at 15% per annum and providing nearly one-third of the world's fish and shellfish (Moore *et al*, 2004).

Under previous legislation, applications for aquaculture space were processed on a first-come first-served basis, which led to a “gold-rush” of marine farm applications in some areas. The legislation did not give local government the ability to effectively plan and allocate coastal space where there was high demand. The government agreed to reform aquaculture management in 2001 and placed a moratorium on new applications for space.

The Aquaculture Reform Act 2004 amended this legislation to provide for aquaculture on a sustainable basis, and providing a balance between aquaculture and other uses of coastal space. The Act enables councils to designate areas of their coastline as Aquaculture Management Areas (AMAs), with no aquaculture to take place outside these areas, and with the space in AMAs to be tendered to the highest bidder.

The aquaculture industry has raised concerns about several aspects of the new legislation, many of which relate to the constraints that it will place on growth. These concerns include:

- The introduction of AMAs effectively gives aquaculture a prohibited industry status outside of defined areas for development; and
- Regional councils will not have the skills, incentives or support to establish AMAs in a timely manner.

The government is working closely with all stakeholders in the implementation of the new legislation to address these concerns. The new legislative framework will allow the New Zealand aquaculture industry to begin growing again, and to make use of the considerable technical expertise that already exists in the country.

## Horticulture

The state of the international market will dictate the fortunes of the New Zealand horticultural industry in years to come. World consumer incomes will continue to rise; we should expect to see further changes in consumer tastes (such as the recent trend towards increased vegetable exports to Asia); and overseas producers will respond to opportunities that these changes in market conditions present.

New Zealand will continue to face significant competition in the international market for horticultural products. One advantage that we have had in supplying northern hemisphere markets is the ability to provide out-of-season production. While this advantage is expected to persist, technological developments such as the emergence of a summer-fruiting kiwifruit in Europe and the widespread adoption of SmartFresh, a technology that extends the shelf life of apples, could potentially erode this.

A number of market access issues still hamper the horticultural industry: both general tariffs – the average tariff in 2001 for fresh vegetables was 58%, and for fresh fruit it was 49% (World Bank, 2004) – and phyto-sanitary barriers such as the ban on export of New Zealand apples to Australia. The Doha round again provides opportunities for some of these global trade barriers to be reduced or removed, and New Zealand is attempting to address the restriction on apples in Australia.

Biosecurity threats will continue to be a worry for the industry going forward. Pests and diseases have the ability to decimate horticultural production, and to cut off access to foreign markets for our produce.

The horticultural industry has been able to increase production and efficiency in recent years through the application of innovation and research and development effort to improve crop management and processing, and to develop new products. The industry has the skills and experience to replicate and build on these improvements over time.

## Forestry

As was discussed in Annex One, large numbers of trees were planted through the late 1980s and the 1990s. These trees will be reaching maturity over the next ten to fifteen years. This will provide the raw material for growth in the earnings of the forestry sector. The “wall of wood” will arrive at a time of growing global demand for wood and wood products. A number of domestic and international factors will determine what it costs to extract and process the wood, and the prices it will fetch on the international market. These are discussed below.

### Domestic Factors

Energy price increases and security of supply issues are key uncertainties for wood processing facilities, which are heavy users of energy. The price of energy is expected to continue to increase in New Zealand from what are, by world standards, low rates. Reasons include the increased demand for electricity by domestic consumers, and for energy more generally internationally (including oil), uncertainty over our gas reserves, plus the new carbon tax which applies from 2007.

Areas such as Northland and the East Coast, which have low populations and significant areas of forests planted, suffer from poor transport networks. These transport problems will be exacerbated as forests mature over the next decade. The government is investing significant funding in improving the roading infrastructure in these areas. This investment will take several years to complete.

Forestry faces labour and skills shortages at various stages in the process (silviculture, truck drivers, processing). These will become more acute as the wall of wood comes on stream.

New Zealand’s domestic climate change policies will present both threats and opportunities to the sector. Forest sinks play an important part in the Kyoto Protocol’s accounting, and the large amount of afforestation through the 1990s has aided New Zealand’s net emissions position in the First Commitment Period (2008-12, “CP1”).

Under the Kyoto Protocol, countries gain credits for afforestation. The flip side of this is that harvesting and deforestation entail liabilities. The government has decided not to devolve credits to individual forest owners. Similarly, owners of Kyoto forests (i.e. those planted from 1990 onwards) will not face any liabilities for deforestation. Owners of non-Kyoto forests will also not face any liabilities, so long as deforestation remains within a cap of 21 million tonnes of CO<sub>2</sub> equivalent, which is equal to deforestation of 10% per annum through CP1. The government does not expect the cap to be breached – historical deforestation rates are 2-4% per annum. However, if the cap looks as if it will be breached, the government will take steps to manage deforestation within the cap. This will include determining whom to attribute liabilities to (i.e. the landowner or the leaseholder, in the case of forests grown on leasehold land).

The forest industry has been critical of the government’s policy on deforestation liabilities. It has argued that the uncertainty around whether and how liabilities will be attributed is a significant disincentive to investment in forestry, and hence a hindrance to future growth.

Domestic climate change policy settings for forestry post-2012 are unclear; these will become clearer as negotiations on future international climate change commitments proceed. If the value of forests as carbon sinks is to be included in production and investment decisions, the forest industry needs to receive appropriate signals.

Pest incursions pose serious biosecurity threats to the forest industry, with Asian gypsy moth and painted apple moth being examples of recent threats. As our international trade and transport links with other countries increase, so does the risk of an incursion. Having our forestry interests concentrated on one species – pinus radiata – increases the potential damage that an incursion may cause.

At present the industry is fragmented and lacks a cohesive structure. There are a number of representative groups covering various parts of the production process (such as the Forest Owners Association, the Farm Forestry Association and the Timber Industry Federation), but attempts to establish broad representative bodies (such as the Forest Industry Council) have only been partially successful. This has made it difficult for the industry to work together cooperatively on industry good matters, and to engage with the government on policy matters.

The forest industry also faces infrastructure challenges. There has been underinvestment in capital, particularly processing, which will need to be addressed as increased volumes of wood become ready for processing. The forest estate is dispersed throughout the country, which underscores the importance of roading and regional processing facilities.

## International Factors

International market conditions play a key role in determining the prosperity of the New Zealand forestry industry. On a number of fronts, recent conditions that are outside the control of New Zealand have not been favourable: commodity prices have been generally low, the exchange rate has been particularly high, and the cost of transport has been especially high. The latter has been largely a result of China's rapid economic growth driving up demand for shipping, but is also related to the increased price of oil. This has increased the cost of getting our forest products to market. These higher transport costs are expected to continue.

Worldwide demand for logs, lumber and panels is expected to strengthen over the next few years, though New Zealand's ability to respond will be somewhat tempered by processing capacity constraints. The expected movements in international prices for wood vary across product categories, but over the next few years they are generally not expected to rebound from their current weakness. New Zealand may well also face stronger competition from other forestry exporters.

More work is required to address tariffs and technical barriers to trade in forestry products. Efforts are being made in bilateral and multilateral trade liberalisation, and work is being done to get radiata pine certified to building standards in various countries, including China.

## Mining

On the demand side, as mining output is often an intermediate input to other production processes, demand for output is often related to demand for other products. So as demand for dairy and forestry products increases, demand for fertiliser increases; and as general economic growth increases, demand for aggregates for roading and infrastructure increases.

On the supply side, the mining sector has the potential to provide a significant increase in the country's economic growth performance going forward. Studies by the Institute of Geological and Nuclear Sciences have estimated the value of New Zealand's metallic mineral stocks at \$86 billion (Christie and Braithwaite, 1999). Much of this cannot be accessed at present, as it is on land of high conservation value, such as national parks, where mining is effectively prohibited. Nearly 40% of the country's metallic minerals cannot be accessed for this reason, and a further 35% is potentially subject to veto by the Minister of Conservation (NZIER, 2004).

If these metallic mineral resources could be accessed, this would allow a rapid increase in mining's contribution to GDP growth both directly and indirectly. The NZIER (2004) has estimated that by 2010 mining could add an extra \$3.8 billion, or 2%, to GDP annually, creating 25,000 more jobs and 4.1% more exports.

Such an increase in growth could come at a cost in the form of environmental impacts, which needs to be weighed against the potential benefits. To date a cost-benefit analysis of expanding mining in such a way has not been undertaken. This is an area that could be investigated further.

As was mentioned in Annex One, the bulk of the gas condensate fields at Maui and Kapuni has been extracted, with around 14% of reserves remaining at the start of 2004. Exploration activity in the sector is high at present, and high world prices for oil are expected to further fuel this activity. New fields such as Pohokura and Kupe are expected to be in production within the next few years, which will to some extent offset the reduction in output from Maui and Kapuni. The government has introduced a package of initiatives to accelerate exploration and discovery of new petroleum reserves in frontier basins. The package includes a reduction in royalties coupled with acquisition of data and a promotional plan to attract new investment.