



NEW ZEALAND BIOTECHNOLOGY INDUSTRY GROWTH REPORT 2008



MINISTRY OF
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MINISTER'S FOREWORD

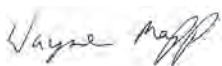
New Zealand's future productivity is built upon our innovative ideas in the biological sciences. This New Zealand Biotechnology Industry Growth Report is an in-depth and independent look at the biotechnology industry in New Zealand and how it has progressed in the two years since the original study in 2006. It shows the important developments in the biotechnology sector and identifies some exciting new trends.

The world faces significant challenges as we go forward into the future in economics, the environment, human health, and in our ability to meet ever-growing global food and fuel needs. Continuing growth in the biotechnology sector is imperative as we attempt to tackle some of these challenges and work towards creating a sustainable bioeconomy.

New Zealand has a strong history as an innovator, particularly in the biological and agricultural sciences. Our leading-edge technologies in these sectors are world-renowned and their profile has continued to grow in the last few years. As this report highlights, Government remains a strong supporter of this flourishing industry, investing almost \$250m across the biotechnology sector.

This report shows the growth in the industry between 2005 and 2007 with the total number of organisations engaged in biotechnology activity increasing by 33%. Along with this came a growth in employees in the biotechnology sector of 78%. Net profit of the core biotechnology sector has more than doubled in the last two years and total core sector income grew by 23% from 2005. This is a significant rate of growth.

I hope you enjoy reading this in-depth and independent examination of the last two years developments in New Zealand's growing biotechnology sector. Biotechnology has made and continues to make a major contribution to increasing our productivity and ultimately our prosperity.



Dr Wayne Mapp

Minister for Research, Science & Technology



NZBIO

FOREWORD

Welcome to the second New Zealand Biotechnology Industry Growth Report.

Since the inaugural report was published in 2006 New Zealand's biotechnology industry has made steady progress in many key areas and we are delighted to see the sector is continuing to build on its solid foundation.

This is evidenced by the increased number of companies and people employed by the biotechnology sector, greater company expenditure and in some cases, greater income.

This report also shows an increase in biotechnology sector exports and a growing international profile for many of New Zealand's biotechnology companies, as local firms launch their products and become established in global markets.

As the industry organisation for New Zealand life science companies NZBIO has seen a rapid maturing in the local biotechnology sector. This is driven in part by exposure to international markets and increasing commercial expertise within companies and from the industry's professional service providers.

New Zealand's biotechnology industry may be small in comparison to those of bigger countries and more established markets, but in terms of capability and expertise we are in many cases second to none. At a global level this industry has some unique challenges and also significant potential to contribute to a stronger, healthier and greatly enhanced future.

I would like to thank the Ministry of Research Science & Technology, New Zealand Trade & Enterprise and LEK Consulting for their support and input in preparing the second NZ Biotechnology Industry Growth Report. We trust you will find it useful and interesting reading.



A handwritten signature in black ink, which appears to read 'Bronwyn Dilley'.

Bronwyn Dilley

NZBIO Chief Executive

Section 1:

INTRODUCTION

New Zealand Trade & Enterprise ('NZTE'), The Ministry of Research, Science and Technology ('MoRST'), and NZBIO believe it is critical to be able to measure and track the economic performance and growth of the New Zealand biotechnology sector. We have jointly supported the update of this biennial economic report ('the Report') on the New Zealand biotechnology industry.

The objective of this report is twofold:

1. to measure sector performance and growth over time, and
2. to highlight New Zealand's biotechnology successes and capabilities.

Our goal is to make this report more than just a useful compendium of statistics. We have attempted to highlight the many qualitative successes of the New Zealand biotechnology industry in addition to measuring its quantitative progress, and to highlight opportunities and constraints as the sector moves forward.

This report is structured in five key sections:

- **Sector Growth and Development** (Section 5) provides a crisp overview of the sector which over time will provide a longitudinal perspective of the sector's health and growth and its role within the broader New Zealand economy.
- **Financing and Deals** (Section 6) assesses the ability of the sector to attract funding and its ability to attract deals and collaborations to facilitate the commercialisation of the sector's products and technologies.
- The **Products and Technology** chapter (Section 7) discusses the activities and capabilities of the sector and highlights the achievements being made by New Zealand biotechnology organisations.
- The chapter on **Research Institutions** (Section 8) describes the contributions and capabilities of biotechnology research in the public sector and higher education sector which underpins the industry's long term success.
- **Public Policy** (Section 9) reviews changes in the broad areas of public policy relevant to biotechnology and will over time monitor the progress of the government's policies and initiatives in the sector.

We have also created appendices which provide a snapshot of biotechnology activities across major biotechnology application areas of agbiosciences, human health, medical devices, food biosciences, and industrial biotechnology. As before, we have included appendices on the key technologies employed by New Zealand's biotechnology sector and a description of New Zealand as an investment location for biotechnology in order to educate international investors on New Zealand and its business environment.

We have drawn upon existing publications and reports, notably from Government sources such as Statistics New Zealand, the Ministry of Research, Science and Technology, NZBIO, New Zealand Trade and Enterprise, and Investment New Zealand as well as other non-Government sources such as the New Zealand Venture Capital Association.

Overall, New Zealand remains a great location to invest in and support biotechnology activities. The small size of the sector, combined with its successful growth trajectory, has created a close and vibrant community that is committed to success and is characterised by an ease of "doing business" and a high degree of public/private cooperation. Participants and observers confidently predict continued sector growth and success.

Section 2:

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Section 3:

EXECUTIVE SUMMARY

The New Zealand Biotechnology Industry Growth Report 2008 is the second report in a biennial series, following the publication of the inaugural report in 2006. The 2006 report has been used as a baseline from which to measure the progress of the industry. As such, the 2008 report focuses on the changes occurring in the industry since 2006. The major findings are summarised below:

Sector Growth and Development

New Zealand's biotechnology sector has experienced accelerated growth since 2005. Analysis of growth over time shows that the sector continues to build critical mass along a virtuous circle of supporting dimensions - the number of organisations, their employment, expenditures and income.

The total number of organisations engaged in biotechnology activity increased 33% from 2005 to 2007. There are now 168 identified organisations involved in biotechnology in New Zealand. The majority of recent growth has come from small focused biotechnology companies, which is consistent with a vibrant industry in strong growth mode creating and building new companies. The base of biotechnology activities in universities and research institutes has remained stable.

The core category of biotechnology companies which is comprised of companies focused on the production of biotechnology goods and services exhibited tremendous growth in employee numbers. Core sector biotechnology employees increased by 78% between 2005 and 2007, the greatest increase being amongst the technical and trade qualified employees. Total core sector income grew by 23% p.a. from 2005 up to \$276m, and the net profit of the core biotechnology sector has more than doubled in the last two years.

Public company performance was mixed during the period. Livestock Improvement Corporation continued to perform strongly, delivering shareholder returns of more than 36% from November 2006 to November 2008. By comparison, as with other industry sectors over this period, returns for the smaller public biotechnology companies were mixed reflecting the turbulent economic period worldwide.

The biotechnology industry is continuing to make significant contributions to the national economy. Export revenues grew by over 35% p.a., as New Zealand organisations continued to increase their exposure internationally, with some notable successes such as New Zealand Pharmaceuticals. The biotechnology industry has also made wider economic contributions: a recent report showed that for every one full-time equivalent job in the biotech industry, a further 2.41 jobs are created in the national economy.

This report establishes that other important characteristics of the biotechnology industry have remained relatively constant since the previous report: the major constraints for the biotechnology industry remain access to capital, and the challenge of recruiting suitably qualified and experienced staff; biotechnology employees remain distributed throughout New Zealand; and of all the diverse applications of New Zealand biotechnology, agbiosciences maintain the dominant focus.

Sector Funding

Government investment in the sector has increased with research funding of almost \$250m across various areas of the biotechnology industry (up from \$200m in 2005). This funding is available through a variety of agencies and departments, including the Foundation for Research, Science and Technology (FRST), Health Research Council (HRC), Royal Society of New Zealand (RSNZ), New Zealand Trade and Enterprise (NZTE), and the Tertiary Education Commission (TEC).

Venture capital and private equity investment has soared since 2005. VC and PE investment in biotechnology in 2007 encompassed 23 deals representing an investment of almost \$67m, more than triple the investment of 2005. The human health and food related areas of biotechnology have become the largest areas of venture capital funding over the last two years with over 30 deals completed in these areas alone.

Publicly listed biotechnology companies have also matured over the past two years. There were no new listings during this period, but listed companies continued to raise public funds through secondary offerings, which increased in size since 2006. Over \$100m was raised for the sector from large secondary offerings alone. Notable capital raisings include Comvita raising \$11.5m in 2007 to partially fund its acquisition of Olive Products Australia; Pacific Edge Biotechnology raising \$5.2m to carry the company through to the launch of the first product on to the market; and Living Cell Technologies raising \$15m over six months to support its type 1 diabetes Phase I/IIa clinical trials in Russia and New Zealand. Living Cell Technologies also listed on the International OTCQX in 2008 and began trading in the United States, making it the first NZ based company to do so.

Recipients of Government funding have changed subtly since the 2006 report. Crown Research Institutes and universities are still the greatest recipients of Government funding for biotechnology, and have increased their share to 81% of funding in 2007 (up from 72% in 2005). This reflects the commonality between the early stage focus of these funds and the focus of the public sector and higher education organisations.

Technology and Products

Many of New Zealand's companies and industries rely on biotechnology-derived innovation to improve and/or differentiate their business. One of the most common measures of growth in innovation and product development is the number of patents granted.

New Zealand biotechnology patent volume has grown at 9% p.a. since 2005 with 230 patents granted in the last two years. Within OECD countries, New Zealand has dropped from 7th to 12th measured by patents per capita, however New Zealand remains significantly above the median nation. On the international scene New Zealand has demonstrated a specialisation in patenting biotechnology relative to innovation in other fields.

The biotechnology sector is growing in productivity as increasing numbers of companies are able to create, improve and introduce new products. Approximately 75 biotechnology organisations released new or significantly improved products or services over 2006-2007. Examples of successful organisations developing new technologies include:

- Victoria Link, the Malaghan Institute of Medical Research, Industrial Research Ltd and Grow Wellington working together to develop a vaccine against cancer,
- Meat & Wool New Zealand and AgResearch participating in an international project to map the sheep genome, and
- Aquaflo Bio-nomic Corporation producing 'green-crude' from its proprietary processes which convert wild algae to next generation fuels.

Many companies are focused on the evolving applications for biotechnology to meet the challenges of the new bioeconomy, including in:

- Clean/green technologies: Lanzatech Ltd and their proprietary ethanol production processes from industrial waste flue gases, and Biodiesel Oils Ltd with their commercial manufacture of biodiesel from oil.
- Climate change: PGG Wrightsons Ltd and their advanced grass cultivar development programmes for future-proofing grasses against warmer global temperature.
- Agricultural productivity to meet rapidly growing global demands for food: Agriseeds Ltd and associates with their advanced yield (AYT) and National Forage Variety Trials (NFVT), and Livestock Improvement Corporation with their programme to obtain cattle genotypes with better feed conversion efficiency.

Research Institutions

New Zealand's research institutions continue to play a critical role in the continued growth and development of New Zealand's biotechnology sector. Significant levels of high quality biotechnology research continue to be conducted by New Zealand's Crown Research Institutes and across the higher education sector.

Each of the eight publicly-owned Crown Research Institutes (CRIs) specialises in a field of research such as forestry, pastoral research or industrial research. The CRIs sustain research capability and infrastructure in areas of strategic importance to NZ and that can deliver benefit to NZ.

The amount of expenditure on biotechnology by research institutions, the number of employees, and the number of institutions engaged in biotechnology activities has remained relatively constant over the period.

An increase in the number of postgraduate degrees awarded in biological science and health indicates a high level of interest within the universities for biotechnology related research. Approximately 700 related postgraduate degrees have been awarded in each of the last three years of data (2004-06), up from around 500 in 1999.

New Zealand's research institutions continue to make a number of significant contributions in the field of biotechnology. Examples include:

- A new state of the art centre for the production and innovation of omega 3 oil emulsion with enhanced bioavailability was opened in Marton through a collaboration between Massey University, the Riddet Institute, and Speirs Nutritionals,
- Collaboration between IRL and Victoria University to passively monitor the heartbeat of unborn babies. The research aims to create technology that separates foetal heartbeats from interfering sounds such as the mother's heartbeat, helping to reduce the need for repeated use of ultrasound on unborn babies,
- The Malaghan Institute of Medical Research's cancer vaccine platform was expanded in 2008 to include clinical trials against brain tumours (glioblastoma multiform),
- The Masters in Bioscience Enterprise programme piloted at the University of Auckland, is an innovative cross-faculty programme working closely with industry, to produce commercially-savvy science graduates, and
- A number of business incubators complement the research institutions by providing a variety of support structures as well as physical premises as an important stepping stone towards commercialisation for several of the emerging biotechnology companies.

Public Policy

The New Zealand Government continues to be a strong supporter of the biotechnology sector. The Government provides funding for biotechnology to the private sector, public sector and higher education sector through a number of funds, thus playing an important role in addressing what is considered to be one of the most important issues facing the industry. In addition to direct funding of public and private sector biotechnology programmes, Government funding includes initiatives designed to achieve broader industry goals such as the growth of a vibrant venture capital sector and the promotion of trans-Tasman collaborations.

The Biotechnology Taskforce that was set up under the Government's Growth and Innovation Framework has been an important catalyst for significant progress. Key advances which can be related back to the Taskforce include, the creation of a unified industry body, NZBIO, ongoing changes in tax legislation, such as the carry forward of tax losses, and creation of the Australia New Zealand Biotechnology Partnership Fund (ANZBPF).

- Significant developments have also been made in terms of New Zealand's regulatory environment. In general, the regulatory environment needs to address a broad set of issues, ranging from genetically modified organisms to xenotransplantation. Increasing harmonisation with Australian (and global) regulations is expected to enhance the increasingly fluid exchange of funds and resources and innovation between these two countries.

Parliamentary support, however, is not always sufficient as seen in 2007 when the Government was unable to pass legislation to establish the Australia New Zealand Therapeutic Products Authority (ANZTPA) aiming to regulate therapeutic products.

Tax legislation is becoming more favourable to biotechnology companies and investors in biotechnology companies, largely due to changes in allowances for carry forward losses and proposed changes for taxation of foreign based investment.

The Ministry of Research, Science and Technology produced the Biotechnology Research Roadmap in March 2007. This document clearly sets out the Government's future research directions for biotechnology. A Food Research Roadmap is also under development.

Section 4:

DEFINING EVENTS

A number of important events have occurred within New Zealand's biotechnology sector over the past several years. These milestones reflect the expansion of the sector along a number of dimensions, including funding, collaborations and strategic initiatives.

2003

- Biotechnology Taskforce Report published that outlines major goals and initiatives for developing the sector
- CER (Closer Economic Relations) biotechnology discussions held to establish the framework for increased trans-Tasman collaboration

2004

- Australia New Zealand Biotechnology Partnership Fund (ANZBPF) was initiated with an original investment of \$12 million
- Creation of a single industry body, NZBIO
- Proacta secures international funding from GBS Venture Partners, Genentech and Roche
- Three biotechnology companies list or raise funds on NZX and one lists on the ASX

2005

- Sector expenditure exceeds \$640m
- BioPacificVentures closes \$150m fund with international participants including Inventages and Nestlé
- Three companies raise funds on the ASX, including two IPOs
- As part of the New Zealand Venture Investment Fund (VIF), \$40m Seed Co-Investment Fund (SCIF) formed to support investment into small to medium sized businesses
- IRL received further recognition of the value of its technology through BioCryst's significant deal with Roche in 2005. This was followed by BioCryst's deal with Mundipharma in 2006

2006

- SciTech index created by NZX to recognise and promote science and technology companies
- The Government expands the Venture Capital Fund by an additional \$60m, bringing the total fund to \$160m. This is part of the New Zealand Venture Investment Fund (VIF)

2007

- The total number of organisations engaged in biotechnology activity increased 33% from 2005 to 2007
- The number of employees in core sector biotechnology has increased by 78%, the greatest increase being amongst the technical and trade qualified employees
- Total core sector income grew by 23% p.a. from 2005, while the net profit of the core biotechnology sector has more than doubled in the last two years
- Venture capital and private equity investment in biotechnology in 2007 is more than triple the investment in 2005
- Patent volume has grown at 9% p.a. since 2005 with 230 patents issued in 2007

2008

- Export revenues grew by over 35% p.a
- Government investment increased with research funding of almost 250M across various areas

Section 5:

SECTOR GROWTH AND DEVELOPMENT

Highlights

New Zealand's biotechnology sector has experienced strong accelerated growth since the last report in 2005. Analysis of growth over time shows that the sector continues to build critical mass along a virtuous circle of supporting dimensions - the number of organisations, their employment, expenditures and income.

- The total number of organisations engaged in biotechnology activity increased 33% from 2005 to 2007. Over the same period, the number of employees in core sector biotechnology has increased by 78%, the greatest increase being amongst the technical and trade qualified employees.
- The majority of recent growth has come from small core biotechnology companies, which is consistent with a vibrant industry in strong growth mode creating and building new companies, while the base of biotechnology activities in universities and research institutes has remained stable.
- Total core sector income grew by 23% p.a. from 2005, while the net profit of the core biotechnology sector has more than doubled in the last two years.

Public company performance was mixed, with Livestock Improvement Corporation continuing to perform strongly, delivering shareholder returns of more than 36% from November 2006 to November 2008, while the average public biotechnology company gave poor returns, consistent with the turbulence worldwide in the public markets for biotechnology and other sectors.

With the critical area of export revenues growing by over 35% p.a. the sector is becoming an increasing source of revenue for New Zealand, as New Zealand organisations continue to increase their exposure internationally, with some notable successes such as New Zealand Pharmaceuticals. The biotechnology industry has made other significant contributions to the New Zealand economy with a recent report showing that for every one full-time equivalent job in the biotech industry, a further 2.41 jobs are created in the national economy.

The major two constraints for the biotechnology industry remain access to capital and the challenge of recruiting suitably qualified and experienced staff.

Biotechnology organisations in New Zealand are active in applications as diverse as human health, agbiosciences, medical devices, industrial biotechnology and food biosciences. Agricultural biotechnology continues to maintain a dominant position. Of 168 biotechnology companies surveyed in 2007, over 100 stated at least some involvement in agbiosciences.

Geographical segmentation of the core sector employees illustrates that biotechnology work is being undertaken throughout New Zealand, with almost 40% of staff in the Auckland region and approximately 15% in the South Island.

The New Zealand biotechnology sector has grown strongly over a number of key dimensions during the past several years. In this section of the report, we highlight the key changes and developments that have characterised the New Zealand biotechnology sector over the past two years, including:

- Numbers of organisations and employees;
- Financial results of the sector including income, expenditure and net profit;
- Public company performance; and
- Economic impact of biotechnology.

5.1 Organisations and Employees

Number of Organisations

The 2007 Statistics New Zealand Biotechnology Survey, which captures the vast majority of relevant organisations, encompassed 168 organisations involved in biotechnology. This represented an increase of one third since the 2005 survey, where 126 organisations were identified.

The Statistics New Zealand Biotechnology Survey is based on the OECD's definition of biotechnology:

"The application of science and technology to living organisms, as well as parts, products and models thereof, to alter living or non-living materials for the production of knowledge, goods and services."

The 2007 release of the Statistics New Zealand Biotechnology Survey defines three groups of biotechnology organisations:

- "the core group is focused on the production of biotechnology goods and services;
- "the active group operates in fields other than biotechnology and uses biotechnology processes; and
- "the research group involves the research and development of biotechnology processes and includes the higher education sector, crown research institutes and other research firms."

Data for the research and active group organisations, which are often larger and less focused on biotechnology is difficult to classify. Statistics New Zealand has opted not to release headcount and financial data for these groups due to uncertainty regarding the responses to the survey. As such, financial and headcount data within this section is only presented for the core group of companies. This will give a more robust analysis and improved correlation between years.

Number of Biotechnology Organisations

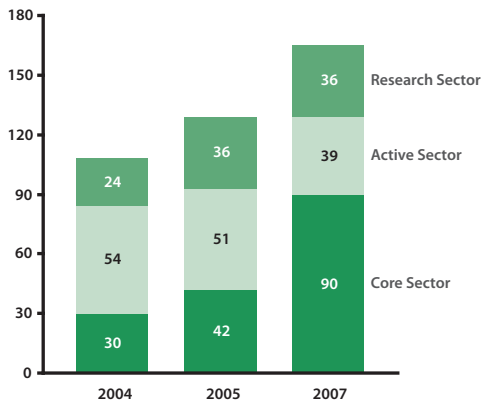
Category	2004	2005	2007	CAGR% (2005-07)
Core sector	30	42	90	46.4
Active sector	54	51	39	(12.6)
Research sector	24	36	36	0
Total	110	126	168	15.5

Note: Data random rounded to base 3

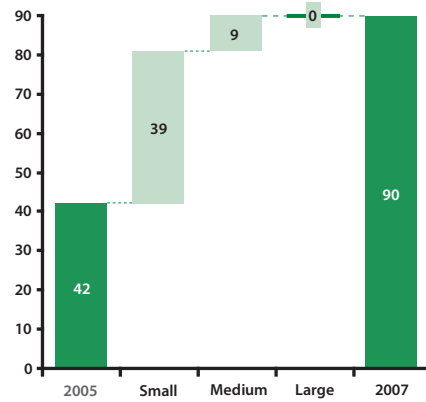
Source: Statistics New Zealand

Growth in the number of organisation has continued strongly since 2005. The latest data show this growth has been driven primarily by the formation of new core biotechnology firms; their numbers have tripled over the three years. The vibrancy of the industry is reflected in the growth of small core sector companies where growth was the strongest. This provides positive evidence that the regulatory and funding mechanisms are supportive of new company formation.

Number of Biotechnology Enterprises by Sector (2004-2005)



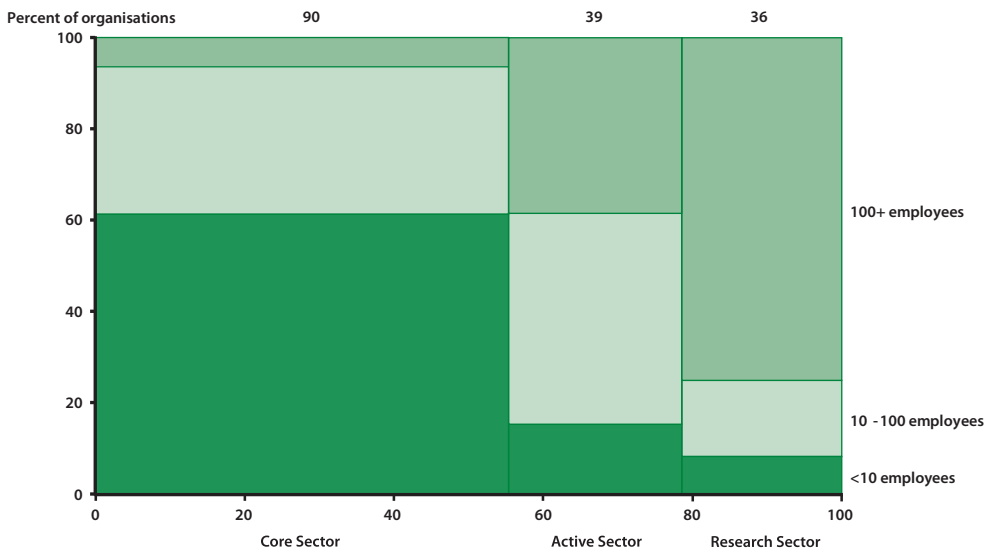
Growth in Number of Core Sector Organisations by Size (2005-2007)



Note: Number random rounded to base 3
 Source: Statistics New Zealand

The data exhibit some clear trends around organisation size and focus area. The core sector, focused on the production of biotechnology products, is dominated by smaller enterprises. By contrast, the research sector is more heavily weighted toward larger organisations, with approximately 75% of enterprises having more than 100 employees.

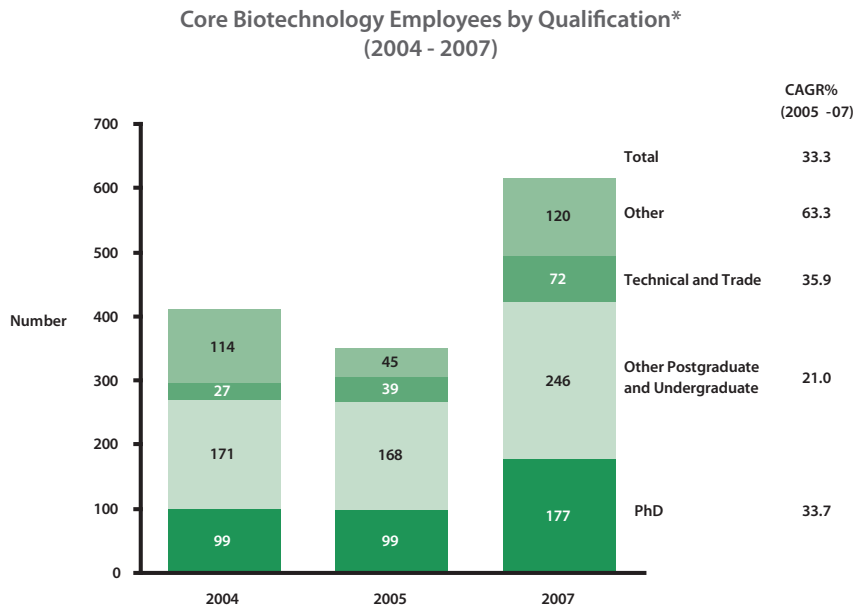
Number of Organisations by Type and Size (2007)



Source: Statistics New Zealand

Number of Employees

The core biotechnology sector employed 618 people, compared with 348 in 2005¹. This represents a healthy growth rate of 33% p.a. Going forward, a consistent time series will be developed to allow improved comparison across time periods.



Note: *By headcount, not FTEs
Source: Statistics New Zealand

In line with previous years, 2007 data shows that tertiary qualified employees make up the majority of the employment within the core sector. Employees with PhDs make up 29% of core sector employees, a proportion that has remained constant over the last two years. Employees with other postgraduate and undergraduate degrees make up 40% of core sector employees. While this has decreased from 48% in 2005, the overall number of postgraduate and undergraduate employees has still been growing at over 21% p.a., underpinning the strong growth of the sector.

The greatest increase, however, has been in other employees with the technical and trade qualification category growing by more than 36% p.a. over the prior period. Lower qualification levels have also grown strongly over the last two years, now making up 20% of total staff.

5.2 Financial Performance

Analysis of the financial results of the Core sector illustrates a buoyant industry experiencing rapid growth. The increasing maturity of the industry is demonstrated by its increasing profitability while at the same time there is a wealth of newer companies being formed.

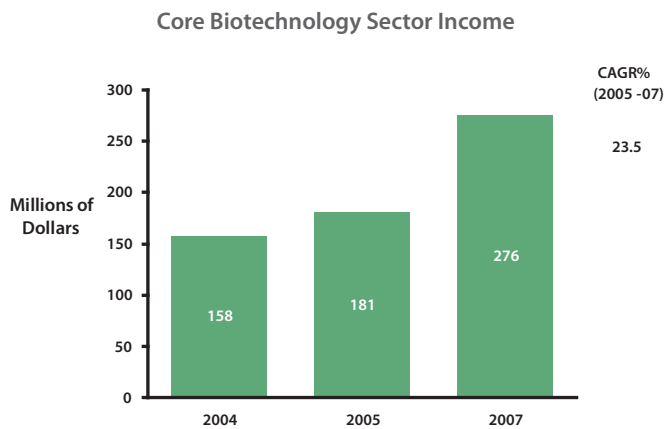
Biotechnology Income

In 2007, the 90 core biotechnology enterprises generated a total income of \$276m, significantly greater than the \$181m income generated in 2005, which represents a strong 23% compound annual growth rate (CAGR).

At the same time, the average income per company has declined from \$5.3m in 2004 to \$3.1m in 2007. This reflects the emergence of new, small companies in the core sector that are still early in their journey towards commercial profitability.

1 Recent changes to the Statistics New Zealand Biotechnology Survey mean that only core sector employee numbers are measured

HortResearch, a Crown Research Institute formed from several Government departments in 1992, provides an illustration of an organisation that has demonstrated impressive income growth, many years after its foundation.



Source: Statistics New Zealand

Strong Income Growth: HortResearch

HortResearch has been a key part of some of New Zealand's most successful export products, including the Zespri Gold Kiwifruit, and has attracted significant Government funding for some of its R&D projects over the years.

The Crown Research Institute announced revenues and profit well ahead of its business plan in its 2008 Annual Report, as well as returns from IP that exceeded expectations. Significantly, HortResearch notes that cashflow from its operations remains strong.

"2008 has been a strong year for HortResearch with successful outcomes in both scientific and commercial activities, as well as in stakeholder relationships and organisational development."

2008 HortResearch Annual Report

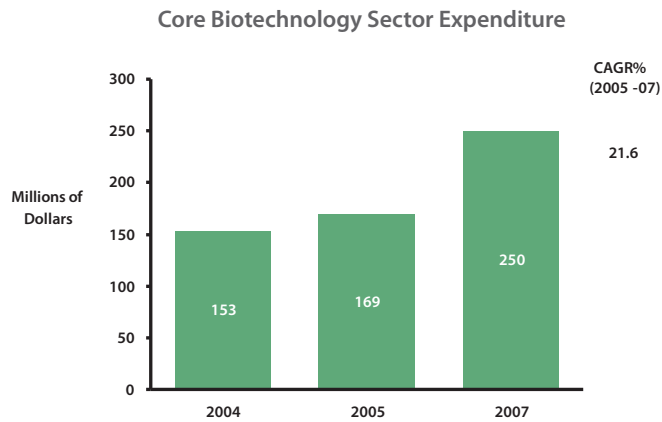
A merger between CRIs HortResearch and Crop & Food Research was announced in early 2008 and the new entity, Plant & Food Research, established.

Biotechnology Expenditure

Biotechnology expenditure is perhaps the most interesting measure of growth and vibrancy of the biotechnology industry, since it represents the level of operating investment in the sector. Expenditure represents a reasonable proxy for the level of intensity of activity within the sector.

Core sector biotechnology expenditure has grown strongly over the past three years from \$153m in 2004 to \$250m in 2007 an increase of more than 21.6% p.a. Comparison with the core sector income growth indicates that expenditure has grown at a slightly slower rate than the income (approximately 2 percentage points more slowly). Average expenditure per company has decreased at an annually compounded rate of 17% which again reflects the emergence of new companies and weights the sector to these smaller entities

Argenta provides an example of a newly emerging biotechnology company. It was formed through Merger and Acquisition in 2006 and has raised expenditure levels for manufacturing facilities and strategic acquisitions.



Source: Statistics New Zealand

Increased Expenditure: Argenta

The world's first Contract Development and Manufacturing Organisation (CDMO) dedicated to animal health, Argenta was formed in 2006 through the acquisition of Nufarm Health and Sciences, which manufactured animal health pharmaceuticals for the Australasian market, and Chemlabs, an animal health research and development company.

The Auckland-based pharmaceutical manufacturing company for animal health took a key step in its US expansion by acquiring New Jersey contract research organisation AlcheraBio in 2008. AlcheraBio is involved in the development of animal health products and technologies, for which the United States represents between 30 and 40 percent of the global market. Argenta has also secured FDA approval for its New Zealand research and manufacturing plant, giving the company access to the lucrative US market and significant credibility in international markets. Argenta now exports to more than 40 countries but does not market its own products, preferring to operate as a research provider and manufacturer.

Net Profit / Loss

Biotechnology companies differ greatly in terms of their net profit or loss (defined as income less expenditures) depending on the nature of the business and the stage of evolution of the technology under development. Profitability goals also differ substantially according to the type of business, with the public sector organisations generally matching income to expenditure. By contrast, private sector organisations are profit-oriented and are managed to provide a return to shareholders and investors. The average profit for core biotechnology companies in 2007 was \$0.29m which has grown at over 20% from \$0.17m in 2004. While the average profit is positive it should be noted that the median biotechnology organisation expends \$0.2m more than it earns.

5.3 Public Company Performance

Company	Stock Exchange	Market Cap. (\$m)^	Sector
A2 Corp	NZX	36	Agbio
Blis Technologies	NZX	6	Human Health
Botry-Zen	NZX	4	Agbio
Comvita	NZX	48	Human Health
Fisher & Paykel Healthcare	NZX	1,539	Medical Devices
Genesis R&D	NZX	3	Human Health
Livestock Improvement	NZX	79	Agbio
Pacific Edge Biotechnology	NZX	9	Human Health
Wool Equities	NZX	6	Agbio
BrainZ Instruments	ASX	1*	Medical Devices
Living Cell Technologies	ASX	46*	Human Health
Neuren Pharmaceuticals	ASX	17*	Human Health
Sunshine Heart	ASX	19*	Medical Devices

Note: ^ As at 1st of November, 2008* Australian dollars

Source: NZX, ASX

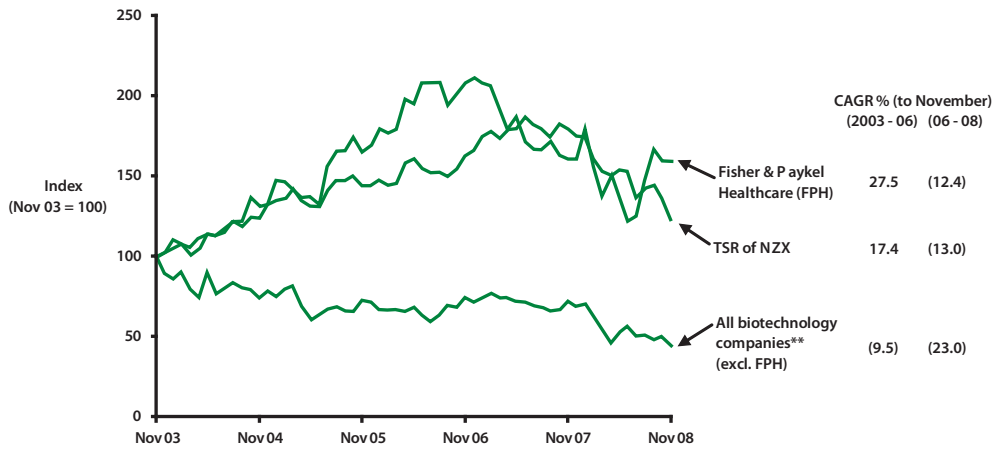
There are currently 9 biotechnology companies listed on the NZX and an additional 4 New Zealand biotechnology companies listed on the ASX. Over the period between 2003 - 2008 the listed New Zealand biotechnology companies have underperformed the overall NZX when measured on the basis of total shareholder returns². Note, however, that the recent period of economic turmoil has particularly affected biotechnology and might not represent longer term performance of this sector.

The New Zealand Stock Exchange's science and technology index called SciTech tracks a number of biotechnology companies in addition to IT and industrial technology companies. Fisher & Paykel Healthcare, as the largest company in the index, has a strong influence on the overall performance. Fisher & Paykel Healthcare has outperformed the other biotech companies, with total shareholder return staying broadly in line with the NZX over the last five years. The biotech index, when Fisher and Paykel is removed, significantly underperformed the NZX.

The highest return to shareholders over the period November 2006 to November 2008 came from Livestock Improvement Corporation which generated a 35% annual growth in its shareholder return. Livestock Improvement Corporation has continued its strong growth after being noted as a top performer two years ago. There were numerous negative performances by biotechnology stocks against a backdrop of reduced confidence in broader global markets. The Australian listed companies performed the most poorly, in particular Neuren Pharmaceuticals and BrainZ which both shed over 60% of their value in the two years to November 2008.

ICPBio, formerly listed on the NZX went into receivership in May 2008. ICPBio manufactured and marketed products for use in biopharmaceutical manufacturing, diagnostics and animal reproduction. ICP had aggressive expansion plans and increased distribution and doubled manufacturing capability in 2007 as it prepared to expand internationally. Management quoted lower than expected sales and a decision not to exercise warrants in February 2008 that left it short of cash. The stock was delisted in July 2008.

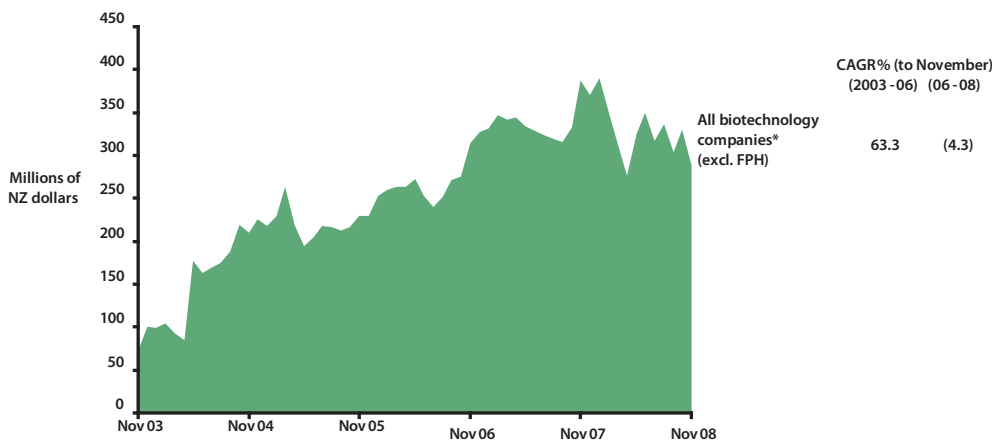
**Total Shareholder Returns* of Listed New Zealand
Biotechnology Companies on NZX and ASX
(November 2003 - November 2008)**



Note: *Share price plus dividend return
 ** Excludes ICPBio (formerly APH). All biotechnology index created by weighting stock prices by market capital
 Source: DataStream, NZX, ASX

The total equity invested in publicly listed biotechnology companies has grown strongly over the last five years, representing investor interest in the sector even as stock prices underperformed. The lack of growth in equity in the last two years reflects the dearth of new IPOs and the poor performance of biotechnology companies and the stock market in general.

**Total Market Capital of Listed New Zealand
Biotechnology Companies on NZX and ASX
(November 2003 - November 2008)**



Note: * Excludes ICPBio (formerly APH)
 Source: DataStream, NZX, ASX

5.4 Economic Contribution

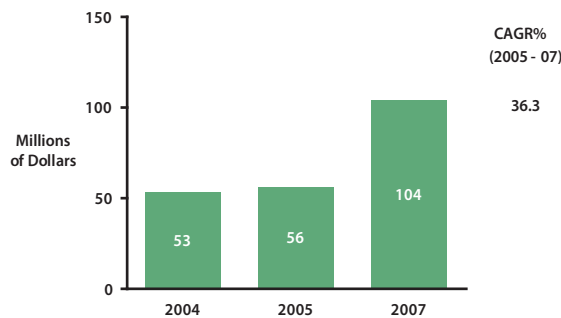
The economic contribution of biotechnology is measured by the value of exports in addition to the value biotechnology adds to domestic industry, for example the agbio products that are used to improve dairy output. Consideration is also made for the regional benefits including employment that boosts regional economies.

Export Revenue

Revenue from exports of core sector biotechnology goods, services, processes and knowledge has increased from \$56m in 2005 to \$104m in 2007. Overall the data indicates biotechnology's contribution to the New Zealand economy is substantial and growing, with an annual increase of 36% p.a. over the last two years.

The proportion of export revenue compared to total sector income has also increased significantly, with 24% of total revenues derived from export sources in 2005 compared to over 27% in 2007. Some companies, such as New Zealand Pharmaceuticals are almost entirely focussed on exporting goods, and are successful at entering a wide variety of markets around the world.

**Core Biotechnology Export Revenue
(2004 - 2007)**



Note: All data random rounded to base 3
Source: Statistics New Zealand

Export Revenues: New Zealand Pharmaceuticals

New Zealand Pharmaceuticals Ltd (NZP) received the 2007 Agritech, Life Sciences and Biotechnology Exporter of the Year Award, in recognition of the company's continued growth in difficult global trading conditions and improvement and investment in their overall capability and capacity.

NZP was formed in 1971 to extract and purify biochemicals from by-products of New Zealand's meat processing industry. In the 1990s NZP refocused its market development onto plant extracts, including blackcurrants, which are aimed at the international functional foods sector and returned a three-fold increase in sales to the company over a 12 month period.

Opening a \$10 million specialty manufacturing facility has given NZP a platform to accelerate its export growth rapidly, providing the firm with much greater operational capability and advanced compliance levels.

NZP exports 99 percent of its products and has more than 150 customers in 30 countries across the globe, including eight of the world's 12 largest pharmaceutical companies.

Market Development Manager Selwyn Yorke has said the foundations are now in place for NZP to achieve annual export sales of \$100 million within the next 10 years.

Wider Economic Contribution of Biotechnology

The biotechnology sector plays a critical role in contributing to and influencing numerous aspects of New Zealand's economy, including the development of companies and employment opportunities, value-add in terms of enabling more efficient and competitive industries and improving the quality of life and security of New Zealanders.

IN a recent NZTE-commissioned report³ on economic multipliers for New Zealand's biotechnology sector, BERL Economics established that:

- For every \$1 million in direct *output* (spending) in the biotech industry, a further \$1.03 million in gross output is created throughout the economy, for a total output of \$2.03 million.
- For each \$1 million of direct GDP that flows through the economy, an additional \$950,000 in GDP is generated, for a total of \$1.95 million. Put another way, **the total multiplier for GDP in the biotech industry is 1.95.**
- For every one full-time equivalent job in the biotech industry, a further 2.41 are created in the national economy. **This equates to a total multiplier for employment in the biotech industry of 3.41.**

The multipliers presented in the BERL report were conservative compared with figures published overseas, but are within the same range. A common theme in the literature and an independent finding of the BERL report, was the large employment multiplier in the industry as a result of its capital-intensive nature and high salaries. The result of this high employment multiplier in the biotech industry is a far greater effect on total national employment than the New Zealand industry's relatively small size would suggest.

On top of economic contributions, New Zealand biotechnology companies are starting to make significant deal flows in offshore markets, which is being fed back to the local economy. Data collected from NZTE-led BIO 2007 and 2008 trade missions to the USA, indicated that 32 deals worth a total of \$21.5 million were successfully negotiated by the New Zealand biotechnology companies. This represents a significant value of over \$670,000 on a per deal completed basis, with most of the proceeds flowing back into the New Zealand economy as well as leading to a strengthening of the biotech companies and sector as a whole.

Local venture capital has also supported the industry adding over \$55 million in investment into the local biotech sector. Indeed, the contribution is significant and for the first time biotechnology has outperformed Information and Communications Technologies (ICT) as the major sector attracting venture capital funds and stimulating economic outcomes⁴. Foreign Direct Investment (FDI) into the biotechnology sector in New Zealand is also enhancing the contribution of this sector to the overall New Zealand economy. There has been an upward trend in FDI activity over the 2006-2008 period including significant contributions in the area of Animal Based Therapeutics (ABT) for use in medical/healthcare applications. However in the Asia-Pacific region food and agricultural biotechnology have enjoyed significant economic growth and are the second largest sub-sector in this region.

The increasing contribution of biotechnology to New Zealand's economy is mirrored by trends seen from USA, Asian and European markets where the biotechnology sector continued to grow in a range between of 9-12% and integrate itself as an important asset and contributor to the countries' economies. Significant sub-sector growth in medical/healthcare has also been an increasing trend noted in these markets.

“NZP is developing a new commercial capability through the development of technology to manufacture pharmaceutical ingredients. The substantial support from FRST's TechNZ has underpinned this development and NZP has moved forward more quickly with this solid support.”

Selwyn Yorke
New Zealand Pharmaceuticals

3 Business and Economic Research Ltd (2009) Multipliers for the Biotech and biotech-active industry in New Zealand. BERL report #4687.

4 NZVCA & Ernst & Young (2007) The New Zealand Private Equity and Venture Capital Monitor.

5.5 Constraints to Growth

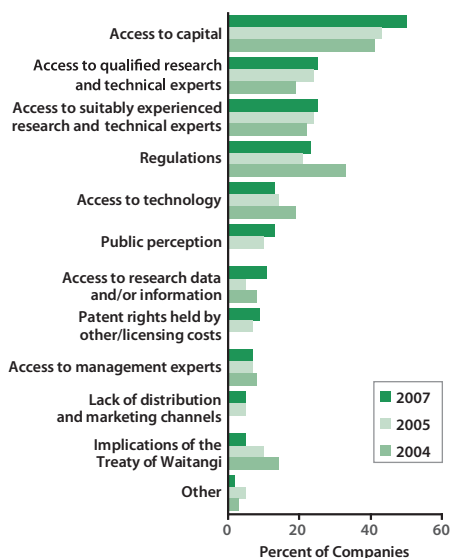
The New Zealand Statistics Biotechnology Survey gives insight into the factors the organisations feel are constraining their R&D and commercialisation of products.

For R&D, the largest constraint is access to capital. This issue has grown strongly as an area of concern since 2005; more than 50% of companies raise this as their primary concern. Two of the top three constraints relate to recruiting suitably qualified and experienced staff. It is notable that the greatest three constraints are concerns external to the sector, while positive reflection of the industry structure is clear from the reduction in mentions of constraints due to regulations and access to technology.

When referring to constraints affecting biotechnology commercialisation, respondents were on the whole much more positive than during the previous survey. Access to capital was by far the biggest concern in 2007, while concerns about regulations decreased markedly from 24% of companies in 2005 to 15%.

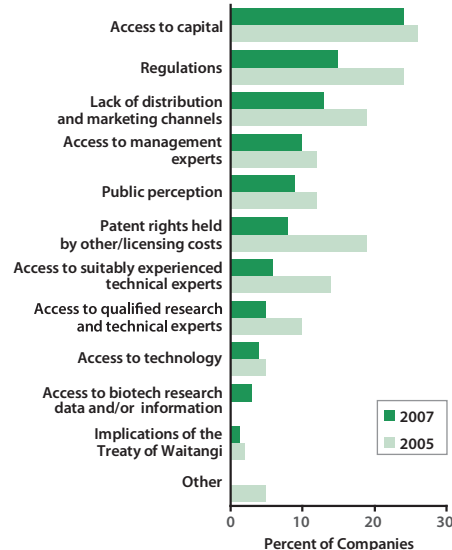
The two major constraints are discussed further: access to capital is discussed in Section 7 and the important issue of recruitment is discussed below.

**Constraints Affecting Biotechnology R&D
(2004, 2005, 2007)**



Source: Statistics New Zealand

**Constraints Affecting Biotechnology Commercialisation
(2005, 2007)**



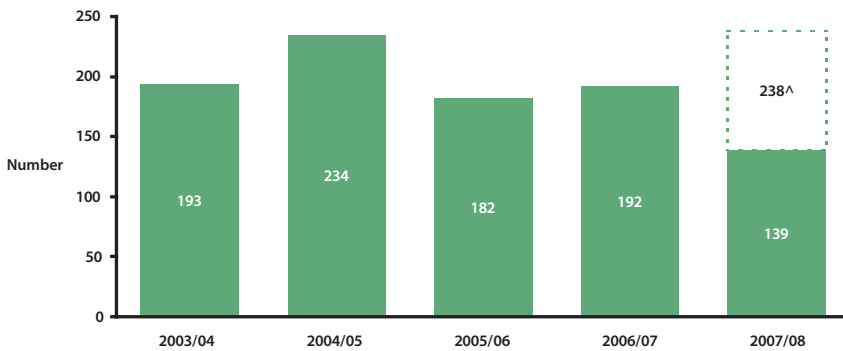
Source: Statistics New Zealand

Recruitment

Attracting qualified personnel from overseas to supplement domestic employment remains an important avenue for the biotechnology industry.

The number of biotechnology work visas issued by the Department of Labour has remained broadly constant over the last five years. In February 2008, the Department ceased using the New Zealand Standard Classification of Occupations (NZSCO) moving to a combined system with Australia, so continuity of data ceases at this point. However assuming a constant rate of visa approval throughout the year, the approvals in 2008 were tracking significantly ahead of previous years.

**Biotechnology Related Work Visas Approved*
(2004 - 2008)**



Notes: *Includes the NZSCO categories Agricultural and Natural Resource Scientists; Biologists, Botanists, Zoologists, and related professionals; Chemists; Microbiologists and related
 ^ The source definitions changed on 2 February 2008. This value has been scaled pro-rata to represent a full 12 month period to end of June
 Source: Department of Labour (Immigration)

“The Biotech sector in New Zealand still struggles to attract suitably qualified and experienced personnel. There is a lack of understanding amongst school leavers of the opportunities afforded by careers in commercial science and no one is leading the effort to excite or educate them about these. This is compounded by a lack of major international commercial R&D enterprises meaning that our young people have no role models so neglect science as a career option, and there is no outflow of truly world class, experienced commercial scientists who understand best-practice in biotechnology development.”

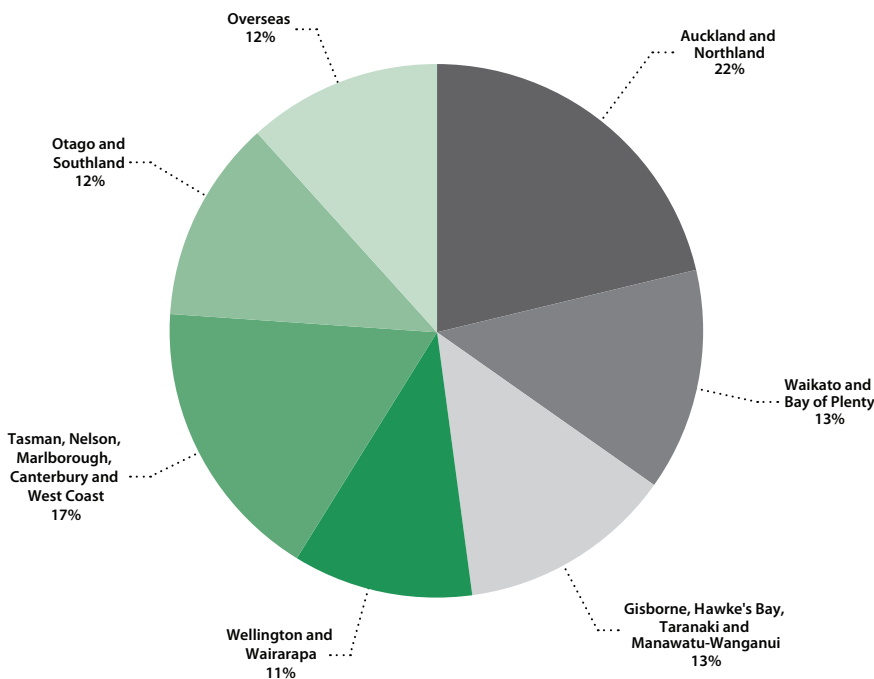
*Elizabeth Hopkins
Keratec Limited*

5.6 The Biotechnology Sector by Region

The biotechnology sector has a presence in all regions of New Zealand although around 60% of the companies active in biotechnology are located in New Zealand’s North Island.

The largest city, Auckland, makes up around 22% of these companies. The Central region and the Waikato region also contribute significantly with 24% and 13% of companies respectively.

**Regional Use of Biotechnology 2007
(% of Total Organisations Active in Biotechnology)**



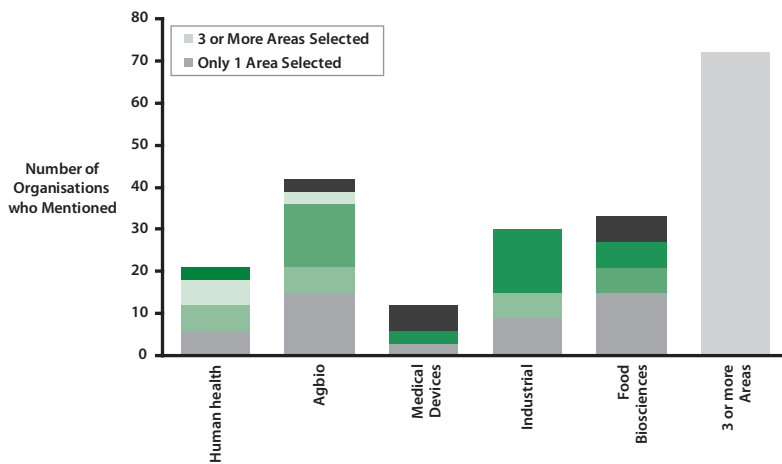
Source: Statistics New Zealand

5.7 The Biotechnology Sector by Application

The biotechnology sector in New Zealand is a diverse industry with organisations active in a gamut of biotechnology applications including human health, agbiosciences, medical devices, industrial biotechnology and food biosciences. While New Zealand’s biotechnology organisations operate in all areas, agricultural biotechnology maintains a dominant position. Of 168 biotechnology companies surveyed in 2007, over 100 stated an involvement in agbiosciences, while 15 organisations selected agricultural biosciences as their sole area of application.

Most organisations are active across application areas. The chart below illustrates the responses to the 2007 Statistics New Zealand Biotechnology Survey. Only 48 organisations selected one area of application. There tends to be a strong link between agbiosciences and industrial biotechnology, while human health is often linked with medical devices or food biosciences.

Biotechnology Activity by Application Area (2007)



	Human Health	Agbiosciences	Medical Devices	Industrial Biotechnology	Food Biosciences	3 or more areas
Human Health	6					72
Agbiosciences	3	15				
Medical Devices	6	3	3			
Industrial Biotechnology	0	15	0	9		
Food Biosciences	6	6	0	6	15	

“While we are living in unprecedented times globally, the fundamentals of the life sciences industry remain intact for developing valuable, globally scalable firms in New Zealand. On the agbio side, the world is grappling with an incessant need for technology to enhance sustainability and productivity due to reductions in arable land globally, relatively good position in terms of climate change, and rise of food consumption in transition economies. In addition, the demand for functional foods and probiotics continue apace due to continued demand for prevention and wellness. On the biomedical side, breakthrough science for unmet medical needs continues to attract investigator and investor interest due to increasingly complex diseases and unmet needs of an ageing population, rapid patent expiry rates of multinationals with large cash balances, and recognition of pipeline value by investors.”

*Mark J. Ahn, PhD
Victoria University of Wellington*

Notes: Organisations were able to select all application areas they were involved in. As a result some companies have selected only one area of application, others have selected a pair, while others have selected 3 or more areas.
* Data is random rounded to base 3

Source: Statistics New Zealand

Section 6:

FINANCING AND DEALS

Highlights

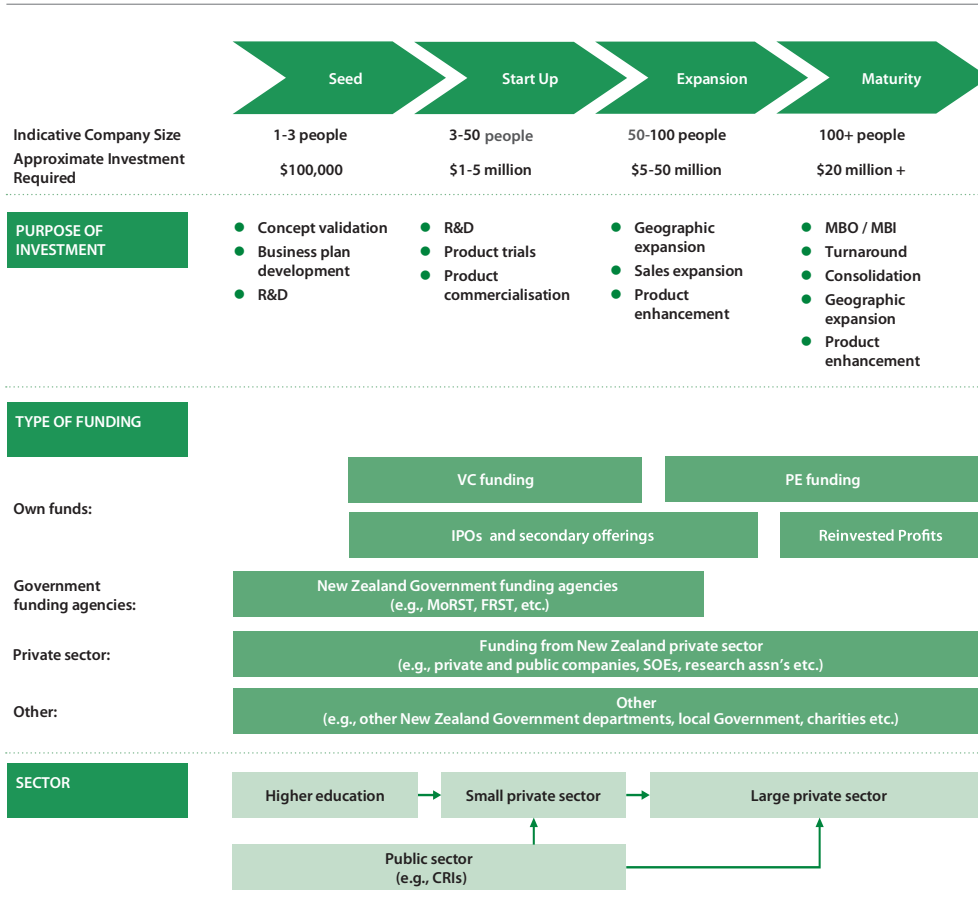
- Government investment in the sector remains significant with research funding of almost \$250m across various areas of the biotechnology industry. This funding is available through a variety of agencies and departments, including the Foundation for Research, Science and Technology (FRST), Health Research Council (HRC), Royal Society of New Zealand (RSNZ), New Zealand Trade and Enterprise (NZTE), and the Tertiary Education Commission (TEC)
 - Venture capital and private equity investment in biotechnology in 2007 encompassed 23 deals representing an investment of almost \$67m which is more than triple the investment in 2005
 - Publicly listed biotechnology companies have matured over the past two years. There were no new listings during this period, but listed companies continued to raise public funds through secondary offerings, which increased in size since 2006. Over \$100m was raised for the sector from large secondary offerings alone
 - Notable capital raisings include Comvita raising \$11.5m in 2007 to partially fund its acquisition of Olive Products Australia; Pacific Edge Biotechnology raising \$5.2m to carry the company through to the launch of the first product on to the market; and Living Cell Technologies raising \$15m over six months to support its type 1 diabetes Phase I/IIa clinical trials in Russia and New Zealand
 - Recipients of Government funding have changed subtly since the 2006 report. CRIs and universities are still the greatest recipients of Government funding for biotechnology, and have increased their share to 81% of funding in 2007 (up from 72% in 2005). This reflects the commonality between the early stage focus of these funds and the focus of the public sector and higher education organisations
 - The human health and food biosciences areas of biotechnology have become the largest attractors of venture capital funding over the last two years with over 30 deals completed in these areas alone.
-

The ongoing viability of the New Zealand biotechnology industry depends on its ability to raise funds from a variety of sources and to complete value-creating deals. This section focuses on two important aspects of commercialisation of the biotechnology sector:

- the ability of the sector to attract funding, and
- the ability of participants in the sector to undertake deals and alliances to facilitate the commercialisation of their products and services.

6.1 Financing

The ability to attract funding remains a critical indicator of the health and vibrancy of the New Zealand biotechnology sector. Financing in the biotechnology sector broadly occurs in a staged manner, as shown in the diagram below:



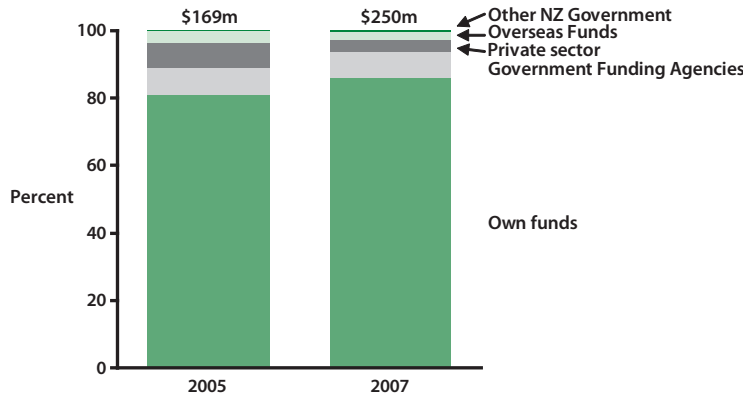
Data available only for the core sector biotechnology companies, which are focused on the production of biotechnology related goods and services, shows of the \$250m in core sector expenditure in 2007, "own funds" accounted for over 85%. Own funds includes external funding received from both public and private investment markets, and includes Venture Capital (VC) funds (private), Initial Public Offerings (IPOs) (public) and secondary offerings (can be either public or private). These funds are generally made available based on commercial terms either as debt or equity, or in the case of VC funds, only after a rigorous investment approval process. In addition, investment of own funds includes invested operating income.

New Zealand Government funding agencies are the next largest source of funding, largely through the Foundation for Research Science and Technology (FRST), Health Research Council (HRC), Royal Society of New Zealand (RSNZ), Tertiary Education Commission (TEC) and New Zealand Trade and Enterprise (NZTE). Each of these funds has a unique mandate and area of focus, ranging from the funding of basic untargeted or "pure" research to late-stage commercialisation assistance. As in 2005, FRST currently contributes the bulk of Government funding for biotechnology.

The private sector and overseas funds contributed 3% and 2% of expenditure respectively. Other sources of funding include other public-sector entities at both the central and local Government level, and other not-for-profit organisations such as charities and trusts.

In dollar terms, the amount of own funds expended grew by \$78m (25% p.a.) to \$214m in 2007. The contribution of Government funding agencies increased at a similar rate. Funding from the private sector decreased from \$13m to \$9m over the two year period.

Core Sector Expenditure by Source of Funds (2005, 2007)



Source: Statistics New Zealand

“The investment in the health and biosciences sector in the year to 31 December 2007 contrasts with the modest levels of investment in 2006, and should be viewed as an endorsement to the high quality of biomedical research technology that some of the major universities have been commercialising.”

The New Zealand Private Equity and Venture Capital Monitor 2007

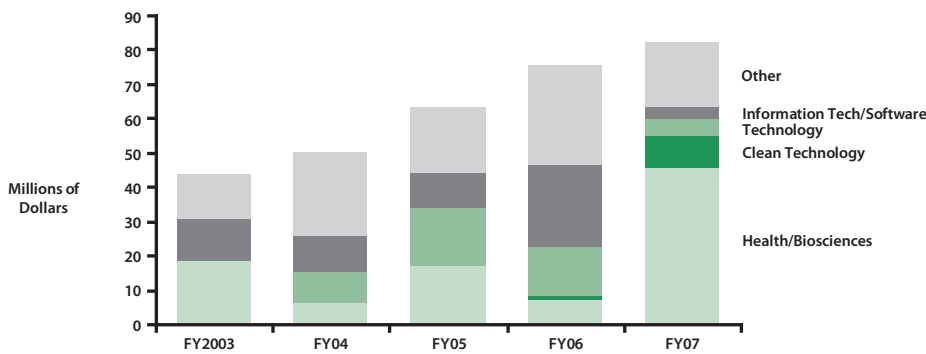
Venture capital funding

Venture capital (VC) and private equity (PE) firms play a critical role in providing funding for commercialisation. These firms often provide the necessary funds for biotechnology companies as they transition from the research and development phase, which may be funded by Government or charitable associations, to later stages of commercialisation where the chances of a successful public listing become significantly greater.

VC and PE funding for biotechnology in New Zealand has been increasing, following wider business trends as the private equity sector matures in both New Zealand and Australia. Total Private Equity and Venture Capital investment in New Zealand across all sectors expanded from \$386m across 80 deals in financial year 2005 to \$1,225m across 85 deals in 2007.⁵ This growth occurred through an increase in the number of Venture Capital deals and a dramatic increase in the average size of Private Equity deals.

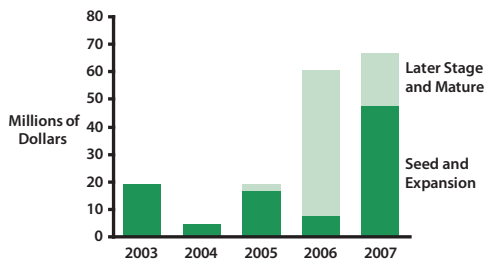
In 2008, a new company was formed between NZVIF and Pacific Channel Ltd, with committed capital of \$8-12m, for investment in new early stage life science businesses in New Zealand.

Venture Capital Sector Investment (FY2003 - 2007)



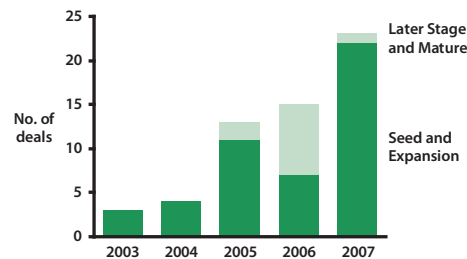
Source: The New Zealand Private Equity and Venture Capital Monitor 2007

VC/PE Funding Raised by the Biotechnology Industry by Stage (2003 - 2007)



Source: NZVCA

Number of VC/PE Deals Raised by the Biotechnology Industry by Stage (2003 - 2007)



Source: NZVCA

For Venture Capital investment, financial year 2007 has proven to be a remarkable year, with over 55% of investment related to the health and bioscience area. This is a sixfold increase on the previous year.

Specific biotechnology industry information from the New Zealand Venture Capital Association suggests that the majority of investments continue to be made at the seed and expansion stage. There were 22 biotechnology related deals in 2007 (up from 12 in 2005). These deals totalled \$48m (up from \$17m in 2005).

IPOs and secondary public offerings

In the last two years there have been no biotechnology IPOs. Instead, value growth has come from a dramatic increase in the number and size of secondary capital raisings as the biotechnology companies mature. Comvita raised \$11.5m in 2007 to partially fund its acquisition of Olive Products Australia; Pacific Edge Biotechnology raised \$5.2m to carry the company through to the launch of the first product on to the market; and Living Cell Technologies raised \$15m over six months to support its type 1 diabetes Phase I/IIa clinical trials in Russia and New Zealand.

There has been over \$100m of secondary capital raised since the last report. Though the table shows only equity raisings over \$1m, many smaller firms have also successfully raised capital. Blis Technologies, for example, has had 8 small capital raisings under \$500,000 over the last two years.

During 2008 ICPBio delisted and is in receivership while Botry-Zen announced plans to delist. Botry-Zen recently stated that their size and financial circumstances meant that being listed on the NZX presented significant, ongoing costs and challenges for the company. Botry-Zen was forced to abort a capital raising in August 2008 as production difficulties led to a change in forecast earnings.

Selected Activity* by Public Biotech Companies

Year	Company	Activity	Market	Value
September, 2006	Sunshine Heart	Institutional capital raising	ASX	A\$20m
September, 2006	Neuren Pharmaceuticals	Share placement	ASX	A\$6.0m
November, 2006	Neuren Pharmaceuticals	Share purchase plan	ASX	A\$1.6m
February, 2007	Living Cell Technologies	Share purchase plan and private placement	ASX	A\$4.3m
March, 2007	Living Cell Technologies	Private placements over 6 month period	ASX	A\$15.0m
August, 2007	Comvita	Placement of shares	NZX	NZ\$11.5m
September, 2007	Comvita	Private share placement	NZX	NZ\$1.5m
November, 2007	Comvita	Rights Issue	NZX	NZ\$11.5m
December, 2007	BLIS Technologies	Rights issue	NZX	NZ\$1.4m
February, 2008	Neuren Pharmaceuticals	Rights issue	ASX	A\$7.1m
February, 2008	Pacific Edge Biotechnology	Share purchase plan and private placement	NZX	NZ\$5.2m
May, 2008	Sunshine Heart	Secondary public offering	ASX	A\$5.4m
May, 2008	ICPBio	Delisting	NZX	-
June, 2008	Living Cell Technologies	Listing of American depository receipts on international OTCQX	OCTQX	-
August, 2008	Neuren Pharmaceuticals	Share placement and share purchase plan	NZX	A\$3.0m
August, 2008	A2 Corp	Rights issue	NZX	NZ\$11.3m
September, 2008	A2 Corp	Institutional share allotment	NZX	NZ\$5.0m
September, 2008	A2 Corp	Institutional share allotment	NZX	NZ\$3.3m
November, 2008	Botry-Zen	Request for delisting from NZX	NZX	-

Note: * Pure equity raising over \$1m

Source: Public Domain

During 2008 Living Cell Technologies listed its American Depositary Receipts on an over the counter US exchange. The OTCQX is used to obtain greater exposure and raise capital in the world market. This is a positive move from LCT to build presence in the USA and to improve liquidity of its stock.

Raising Public Funds: Living Cell Technologies

Living Cell Technologies Limited listed on the International OTCQX in 2008 and began trading in the United States, making it the first NZ based company to do so. The company is also listed on the Australian Securities Exchange which is one of the qualifying foreign exchanges for an OTCQX listing.

The not for profit US based Children with Diabetes Foundation (CWDF) has also established a fund to support Living Cell Technologies' DiabeCell clinical trials for people with type 1 diabetes. The foundation allows supporters of diabetes research to contribute tax deductible donations towards the trials.

CWDF has contributed approximately US\$250,000 towards LCT Medical Director Professor Bob Elliott's research and LCT's development work. The foundation has also invested in LCT and holds 330,117 shares.

New Zealand Government funding

Government funding typically supports early stage research and development for a wide range of basic and applied research. Estimated Government funding for biotechnology projects is \$244 million for financial year 2006/07 and administered by the following organisations:

Research Scheme by Type and Funding Agency

Funding Agency	Research Scheme	Research Type
Foundation for RS&T (FRST)	New Economy Research Fund (NERF)	Basic and Basic-Targeted Research
	Environmental Research	Basic and Basic-Targeted Research
	Research for Industry (RFI) and Research Consortia	Basic and Basic-Targeted Research
	Pre-seed Accelerator Fund (PSAF)	Targeted Research
	Technology New Zealand	Commercialisation and Support for Firms
Health Research Council (HRC)	Health Research Funding	Basic and Basic-Targeted Research
Ministry of Agriculture and Forestry (MAF)	Sustainable Farming Fund	Targeted Research
	Sustainable Land Management Mitigation and Adaptation to Climate Change (with FRST)	Targeted Research
Ministry of Economic Development	Seed Capital Investment Fund (SCIF)	Commercialisation and Support for Firms
	NZ Venture Investment Fund (NZ-VIF)	Commercialisation and Support for Firms
Royal Society (RSNZ)	The Marsden Fund	Basic and Basic-Targeted Research
Tertiary Education Commission (TEC)	Centres of Research Excellence (CoRE)	Basic and Basic-Targeted Research
	Partnerships for Excellence (Pfx)	Targeted Research

Source: MoRST

In previous estimates the Royal Society of New Zealand (who administer the Marsden Fund) included as biotechnology projects, projects that extensively used biotechnology as a tool without the project necessarily having a biotechnology output. The 2006/07 financial year projects were coded only as biotechnology if the work was biotech-outcome focussed.

The HRC have used the same biotech classifications, including basic biomedical research, as the last report to give \$40 million investment in biotechnology. In some of their other publications the HRC have used a more restricted definition and quoted a figure of \$4.3 million.

The New Zealand Government in recent times has pursued a “whole of Government” approach to funding biotechnology. Government has specified funds based on two key dimensions:

- Funds aimed at different areas of the biotechnology industry. For example, the Ministry for Agriculture and Forestry, in partnership with the Foundation for Research, Science and Technology recently announced funding of \$4.6m p.a. for climate change
- Funds aimed around specific developmental phases from untargeted raw research right through to commercial development. For example, the two largest agencies, FRST and HRC, tend to focus funding on Applied Research and Basic Research respectively. In fact FRST set records for funding in 2008

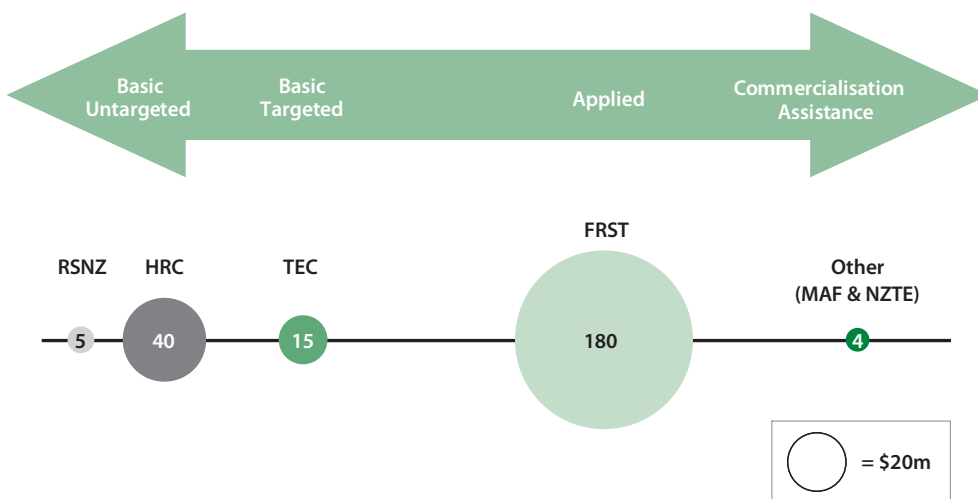
Government Funding: Record Investment in 2008

The Foundation for Research, Science and Technology approved a record \$785 million in contracts with more than two dozen research organisations in its main 2008 investment round.

The 96 contestable contracts were with 24 organisations including Crown Research Institutes, universities, other research organisations and private companies, over time periods ranging from two to six years.

A further 17 contracts were negotiated with seven CRIs and two universities under the Stable Funding Environment initiative. These are worth up to \$43 million in their first year and up to \$347 million in their lifetimes.

New Zealand Government Funding of Biotechnology (2007)



Source: MoRST

Two notable successes in funding applied research have been Fisher and Paykel Healthcare and the Auckland University Cancer Society.

Government Funding for Research

Fisher and Paykel Healthcare: received a Government investment of \$928,000 from Technology New Zealand to support a multi centre clinical trial of the company's humidification therapies to treat the side effects of cancer treatment. The company announced plans to launch a \$1.85 million research and development programme to look at new areas of disease treatment and broaden the company's clinical capability.

(Source FRST, NZBIO)

Auckland University Cancer Society: received \$4.125 million from the Foundation for Research Science and Technology to continue research into anticancer drugs. The investment will continue research conducted over many years into drugs to treat the disease which has resulted in a number of successful licensing deals, and the spin-out company Proacta. Proacta, which already has one molecule from the group in clinical trial, will take any new drugs through the clinical pipeline.

(Source FRST)

There are also considerable funds devoted to supporting the commercialisation of research (often in conjunction with VC and PE investors). The New Zealand Government has established programs to encourage success at this seed and start-up stage, including the Pre-Seed Accelerator Fund (PSAF - managed by FRST) and the Seed Co-investment Fund. They have the reach to fund even relatively small organisations: recently, PSAF awarded substantial funding to a consortium of universities that otherwise would not have had sufficient deal flow to warrant more funding from more developed sources.

Examples of NZ Government Funding Initiatives to Support Pre-Seed and Start-up Funding

Fund	Description	Example Investments
Pre-Seed Accelerator Fund (PSAF)	Accelerates the commercialisation of new knowledge that arises from research carried out by the public sector and not-for-profit private sector research organisations. The eligible projects will receive up to 33% of the overall cost from FRST	WaikatoLink, Lincoln University, AUT University and Canterbury won \$4.94 million to commercialise technologies from their institutions. Crop and Food Ltd invested in the genetic control of apomixis, marine collagen, Begonia breeding, plant cell cultures, Arnica cultivation and CropLogic software
Seed Co-investment Fund	Established in 2005 this fund is aimed at small to medium sized businesses at the seed and start-up stage of development that have strong potential for high growth. It provides \$40 million of matched seed funding to support the development of early-stage investment markets through co-investment alongside selected Seed Co-Investment Partners	Ice Angels has invested in Biomatters, Nexus6 and Go Virtual Medical
Halo Fund	\$5 Million Angel Investment Fund for new Angel Investors	Launched November 2008 for seed and start up companies

Source: Public Domain

Collaboration across funds is also continuing. In one such example, NZTE and Technology New Zealand coordinated efforts to make successful grants to Veritide.

Government Funding for Commercialisation

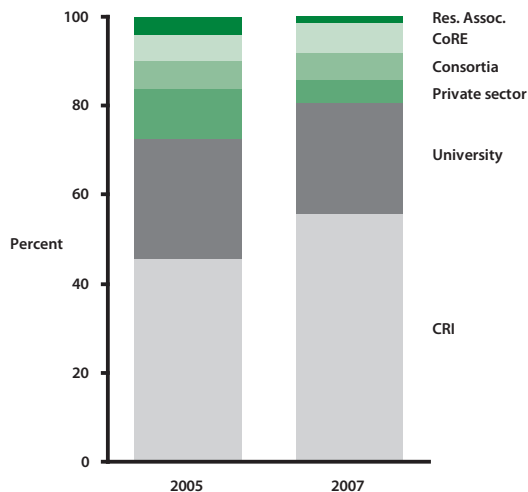
Veritide: secured \$450,000 from Technology New Zealand for research and \$50,000 from New Zealand Trade and Enterprise for market development for its hand-held scanner to identify spores in powder samples. The optical technology developed at the University of Canterbury can identify potentially lethal spores such as anthrax in minutes. Veritide was founded with \$1.6 million of venture funding from Ngai tahu Capital and Endeavour Capital.

(Source FRST)

Funding Recipients

Recipients of Government funding have changed subtly since the 2006 report. CRIs and universities are still the greatest recipients of Government funding for biotechnology, and have increased their share to 81% of funding in 2007 (up from 72% in 2005). This reflects the commonality between the early stage focus of these funds and the focus of the public sector and higher education organisations.

Government Funding of Biotechnology by Type of Organisation* (2005, 2007)



Note: *Split by type of organisation based on available data totalling \$190m in 2005 and \$243m in 2007

Source: MoRST

6.2 Partnerships, Alliances and Deals

Deal activity is another important indicator of progress in the biotechnology industry. Licensing deals generally provide capital as well as validation and exposure to global science and technology experts, and can provide exposure to global capital markets. Deals also provide important contacts and relationships useful for developing distribution capabilities and end-user markets. Given New Zealand's small population and geographic isolation, developing export markets for biotechnology products and services is critical to the growth of the sector.

New Zealand's close relationship with Australia, as well as specialist funds such as the ANZBPF have been influential in promoting partnerships for New Zealand companies.

Trans-Tasman Deals: ANZBPF Fund Recipients

A new grass variety is being developed by Melbourne-based biotech company Gramina, and New Zealand rural services group PGG Wrightson Genomics Ltd following an Australia New Zealand Biopartnering Fund (ANZBPF) grant.

The grass is designed to reduce cattle burps, improve productivity, and help dairy farmers prepare for climate change.

ANZBPF is designed to promote, facilitate and accelerate partnerships between New Zealand and Australian biotech companies, and offers significant financial support for new and innovative proposals.

New Zealand has also used a common area of expertise to establish relationships with other nations, such as Canada.

“There are many similarities between Manitoba [province of Canada] and New Zealand, particularly the scientific expertise within our respective agriculture and health sectors. These similarities, along with the unique opportunities available in New Zealand's rapidly growing life science industry have made the continuation of an ongoing collaborative relationship between the two jurisdictions a priority for the Province of Manitoba.”

Douglas G. McCartney
Manitoba Science, Technology, Energy and Mines

“New Zealand has the makings of an enduring biotechnology industry building on its strengths in agribusiness and niche biomedical sectors. Greater interaction with its high quality public research sector and continued global orientation in seeking partnerships with Australia and elsewhere, both to support local industry, will see further success.”

Peter Riddles
ViciBio Pty Ltd

Examples of significant collaborations and partnerships completed in the last several years are shown in the table below:

Organisations involved	Date Commenced	National or International	Description
BioVittoria and Southern China	2003	International	Commercialising a 100% natural, zero-calorie sweetener made from the Luo Han fruit grown only in Southern China using a business model that has created an increased standard of living for rural Chinese farmers.
Neuren Pharmaceuticals Ltd & US Army's Walter Reed Army Institute of Research	2004	International	Development of second lead candidate, NNZ-2566, which is being developed to treat traumatic brain injury (TBI).
University of Otago and Myriad Genetics, Salt Lake City Utah	January 2007	International	Development of a new technique that makes large-scale gene screening much cheaper.
AgResearch and Massey University	March 2007	National	\$17 million state-of-the-art Hopkirk Research Institute to focus on scientific and technological excellence in areas relevant to the health and welfare of pastoral livestock, particularly infectious diseases endemic to New Zealand that threaten the livelihood of the pastoral sector.
Genesis Research & Development and MorphoSys AG	October 2007	International	Investigation and development of therapeutic antibodies specific for the target molecule FGFR5, implicated in various autoimmune and bone-related diseases.
Shell NZ & Argent Energy NZ Ltd	2007	National	Intent to ensure biodiesel is available to NZ consumers 'at the pump' and meets Government sales targets for biofuels.
Pacific Edge Biotechnology & the Ludwig Institute	2007	International	Development of a prognostic tool for the segregation of patients with invasive melanoma.
BLIS Technologies & Nestle Nutrition	2007	International	Agreement to work together on research and development of BLIS probiotics for use in infant nutrition products, targeting upper respiratory tract infections.
Agriseeds and Molecular Plant Breeding CRC	April 2008	International (trans Tasman)	Development of pastures with greater water efficiency, heat tolerance, insect resistance and for improved animal health.
IRL and University of Arizona	May 2008	International	Research, development and human trials of passionfruit extract to reduce severity of wheezing and coughing in asthma patients and also reduce blood pressure.
HortResearch & Genesis Research & Development	July 2008	National	Public release of the world's most extensive collection of kiwifruit DNA sequences to enable fruit breeders to naturally breed new varieties.

Perhaps the most direct sign of commercialisation success (and one of the key indicators of progress for private biotechnology companies) is to formalise a licensing deal with a major multinational corporation that will take the product through clinical and/or field trials and commercialise the product through their sales and marketing channels. Christchurch based medical devices company Enztec, has recently signed a unique deal for international distribution of its products.

International Deals: Enztec

Medical technology company Enztec is to supply innovative surgical instruments to DePuy International, one of the top four orthopaedic companies in the world with an annual turnover of \$US4.5 billion, and a subsidiary of Johnson and Johnson.

The deal was initiated in 2006 for Enztec to develop three surgical instruments to be sold with DePuy's new portfolio of Sigma and LCS Knee implants and associated products.

Forecast earnings predict the project to be worth multi-millions to Enztec in a unique deal where DePuy will be a distributor of Enztec products, accelerating the growth of the company.

6.3 Mergers and Acquisitions

Mergers and acquisitions (M&A) are another form of corporate activity which reflect the level of activity in the biotechnology industry. Since the inaugural NZ Biotechnology Industry Growth report in 2006, M&A activity in New Zealand's biotechnology sector has included the merger of two Crown Research Institutes to form a new organisation; Plant & Food Research, and the proposed merger of the Crown Research Institute AgResearch with Lincoln University.

M&A activity within the biotechnology industry appears to be on the rise with recent announcements such as:

March 2008: Acquisition of livestock genomic company Catapult Genetics by Pfizer Animal Health. Catapult focused on developing and commercializing innovative livestock DNA tests and gene markers to assist global food producers, processors and retailers in improving profitability and quality in the global food chain. The company marketed itself as "a global innovator and leader in sheep and cattle DNA testing technologies for meat and carcass quality and production efficiency".

June 2008: The acquisition of Australian firm Apollo Cytokine Research by New Zealand biotech company Symansis for A\$500,000. The Australian business specialised in the development, manufacture and marketing of human cell expressed (hcx™) proteins for drug research and offers the world's largest range of these superior human proteins.

December 2008: Two Crown Research Institutes (CRIs) - Crop & Food Research and HortResearch joined forces to form a single research institute known as The New Zealand Institute for Plant and Food Research Ltd (Plant and Food Research). The merger combined knowledge and expertise in nationally important areas of sustainable production, elite genetics, and food and health, which were previously segregated. With a combined capability base of over 900 staff, there are no plans for any site closures or losses in science capabilities as a result of the merger.

Mergers & Acquisitions: AgResearch & Lincoln University

In March 2009 the Chairman of AgResearch and the Chancellor of Lincoln University announced that the Crown Research Institute and the University supported in principle the merger of the two organisations to create a substantially enhanced Lincoln University with a specific and deep focus on land utilisation and associated environmental and social integrity throughout New Zealand.

The stated aim is to create a world-class, land-based University supporting research, education and extension that is focused on New Zealand's vital primary industries.

Media Release, 10 March 2009

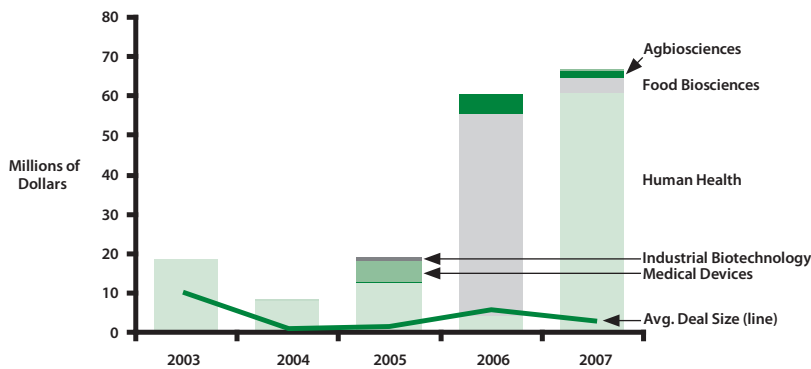
“The message to those who hold the purse strings of investment funds is that NZ biotechs have unique technologies merged from multiple disciplines such as human biology, agbio and horticulture - this is the core of innovative biotech worth funding and developing.”

*Paul Tan
Living Cell Technologies*

6.4 Financing by Region and Application Area

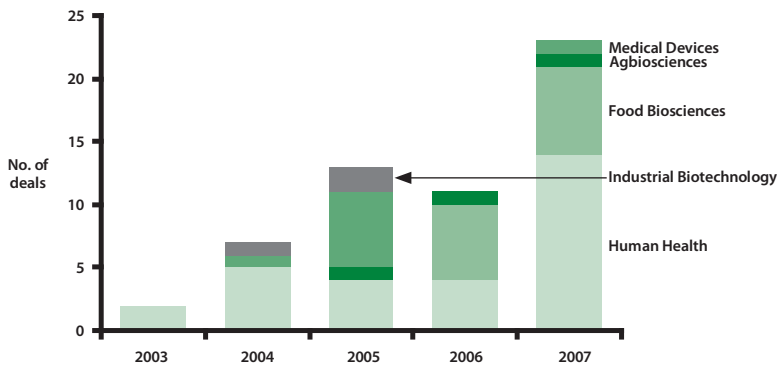
Detailed regional breakdown of financing and deals is not available; however an examination of VC and PE funds raised by application area reveals deals across a diverse range of fields. The majority of funding raised in 2007 went towards the human health application, where the deals were considerably larger than the average deal. There were a total of 18 human health deals across 2006 and 2007 while the food biosciences area was also popular contributing 13 deals. In the last two years there have been no industrial technology deals and a single medical devices deal.

VC/PE Funding Raised by the Biotechnology Industry by Application Area (2003 - 2007)



Source: NZVCA

Number of VC/PE Deals Raised by the Biotechnology Industry by Application Area (2003 - 2007)



Source: NZVCA

Section 7:

TECHNOLOGIES AND PRODUCTS

Highlights

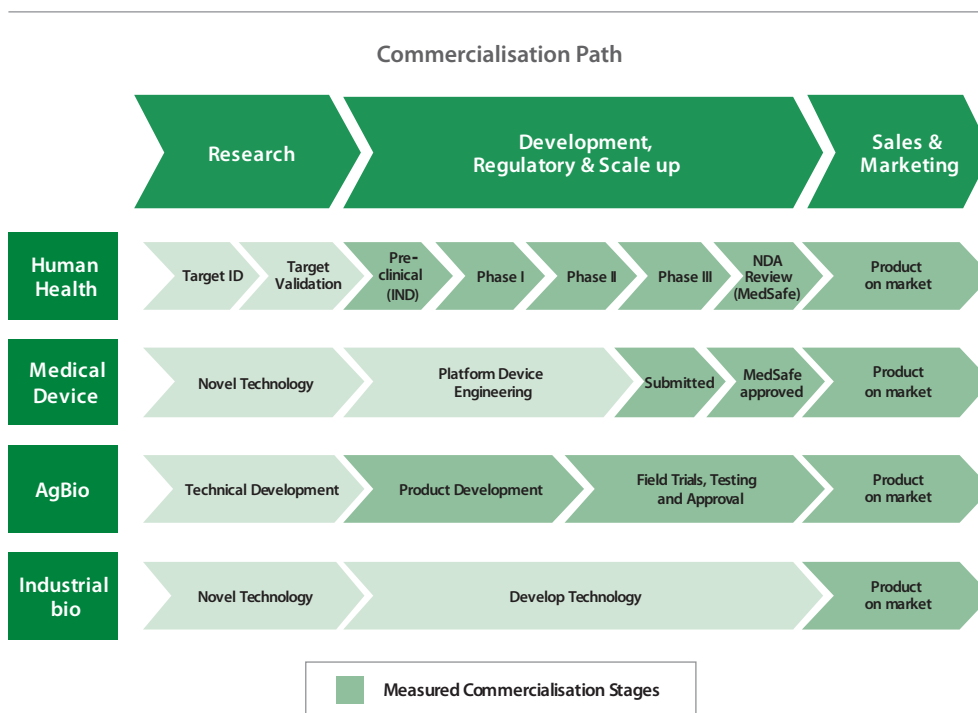
- New Zealand biotechnology patent volume has grown at 9% p.a. since 2005 with 230 patents granted in the last two years. Within OECD countries, New Zealand has dropped from 7th to 12th measured by patents per capita, however New Zealand remains significantly above the median nation.
 - New Zealand has demonstrated on the international scene a specialisation in patenting biotechnology relative to other innovation.
 - The biotechnology sector is growing in productivity as increasing numbers of companies are able to create, improve and introduce new products. Approximately 75 biotechnology organisations released new or significantly improved products or services over 2006-2007. Examples of organisations developing new technologies include:
 - Victoria Link, the Malaghan Institute of Medical Research, Industrial Research Ltd and Grow Wellington working together to develop a vaccine against cancer.
 - Meat & Wool New Zealand and AgResearch participating in an international project to map the sheep genome.
-

The New Zealand biotechnology industry has made significant advancements relating to product development during 2006 and 2007. This section highlights these advancements from patenting to the commercialisation of products and services and the achievement of critical regulatory milestones.

7.1 Overview of Product Commercialisation Pathways

New Zealand biotechnology companies research and/or produce a broad range of products in a variety of application areas. The level of development and regulatory complexity differs significantly based on the application area and the nature of the product. For example, human health biotechnology products such as therapeutic drugs require extensive clinical testing which follows well-established regulatory hurdles. By comparison, industrial biotechnology products such as bio-actives used in production processes have a much lower regulatory burden.

An indicative commercialisation path for some common application areas is shown below; however it is important to note that the regulatory challenge may vary even within a particular application area.



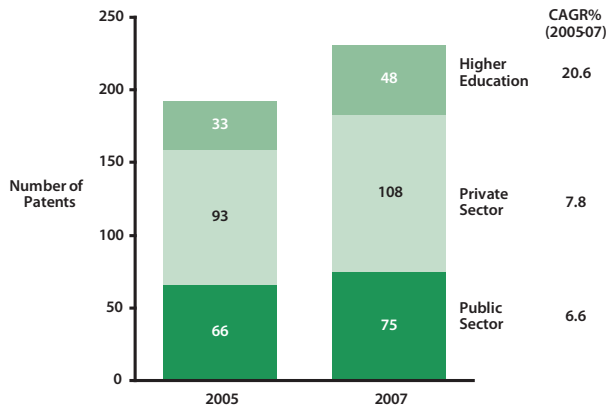
Success in the “Development, Regulatory & Scale-Up” stage can be measured by indicators such as passing clinical trials, field trials and pilot plant developments. These successes are highlighted in Section 8.2 “Research successes”. In the “Sales and Marketing” stage, the best measures of success reflect the impact of the product or technology, either on outcomes or impacts such as market penetration or revenue. These outcomes and impacts can take many years to develop and can be difficult to measure. Therefore in this report, we focus on “Market introductions” in Section 8.4.

This commercialisation path provides a framework for understanding the growth in the sector and an indication of the future outlook. The subsequent sections will discuss this pipeline and show a level of robustness indicating what is likely to be a bright future for New Zealand biotechnology.

7.2 Research successes

The biotechnology industry is grounded in innovative science, with close ties between the strong foundation of basic research and the growth of new companies. One of the first commercialisation hurdles faced by biotechnology companies is to file, and receive, patent approval on their research.

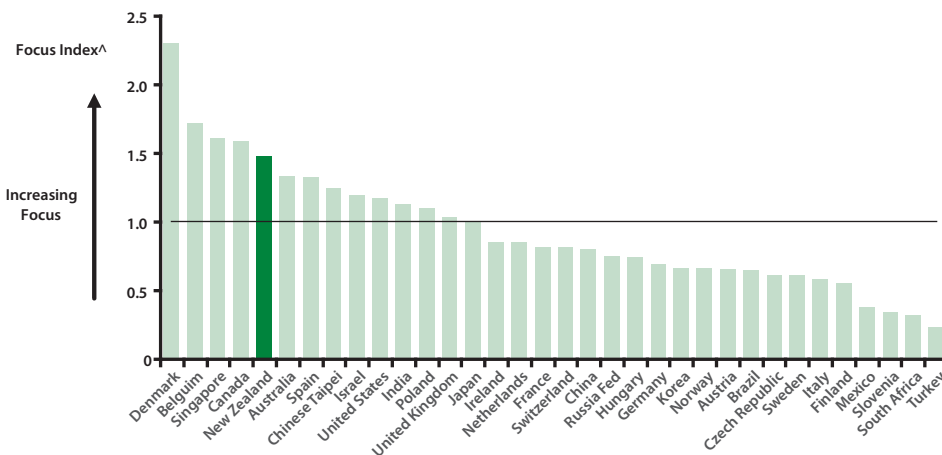
**Number of Biotechnology Patents Granted (within previous two years)
(2005, 2007)**



Note: Random rounded to base 3
Source: Statistics New Zealand

During 2006-07 almost 230 biotechnology patents⁶ were issued. This patent volume has grown at 9% p.a. since 2004-05. This is indicative of a continued substantial increase in the level and quality of innovative research being undertaken in New Zealand combined with increasing awareness of the benefits of investing in IP protection for research with potential commercial value. While the public and private sectors both recorded increase rates of over 6% p.a., the most growth was recorded in the higher education sector, where granted patents grew at over 20% p.a.

**Patent Focus on Biotechnology by Country of Origin*
(2003 - 2005)**



Note: ^Measures the proportion of biotechnology patents relative to total patents for a given country. A value of 1 indicates the proportion is the same as the global average, greater than 1 indicates a specialisation in biotechnology.
*OECD countries only; Patents filed under the PCT (Patent Co-operation Treaty)
Source: OECD Compendium of Patent Statistics

OECD data indicates New Zealand's patent filings are rich with biotechnology. New Zealand ranks among the top 5 in terms of biotechnology patent concentration (a value of one indicates biotechnology patent mix in line with the global average and greater than one a mix greater than the global average).

Patent Applications Filed Under the PCT per Million Population*

2002			2005	
Rank	Country	Patents per million	Country	Patents per million
1	Iceland	44.8	Denmark	20.2
2	Denmark	27.9	Switzerland	12.9
3	Switzerland	15.8	Iceland	10.6
4	Sweden	15.6	Sweden	10.6
5	United States	14.0	Netherlands	10.3
6	Germany	10.7	United States	9.8
7	New Zealand	9.5	Japan	9.6
8	Netherlands	9.3	Australia	7.6
9	Norway	9.2	Finland	7.4
10	Canada	8.8	Belgium	7.2
11	United Kingdom	8.6	Canada	7.2
12	Belgium	8.5	New Zealand	7.2
13	Japan	8.5	Germany	6.2
14	Australia	8.3	United Kingdom	5.4
15	Finland	6.9	Austria	4.8
	Median	6.3	Median	4.7

Note: * OECD countries only; Patents filed under the PCT (Patent Co-operation Treaty)

Source: OECD Compendium of Patent Statistics 2008

Additionally, New Zealand maintained its relatively high number of biotechnology patents per capita, although its ranking amongst OECD countries has declined since 2006.

This could be due in part to the collaborative approach New Zealand biotechnology firms take in developing new technologies. Successful collaboration is evidenced by several examples. Meat & Wool New Zealand and AgResearch participated in a successful project to map the sheep genome and Victoria Link, the Malaghan Institute of Medical Research, Industrial Research Ltd and Grow Wellington all contributed to a project working to develop a cancer vaccine.

New Technology: Cancer Vaccine Collaboration

Victoria Link, the Malaghan Institute of Medical Research, Industrial Research Ltd and Grow Wellington are working together to develop a vaccine against cancer.

The collaboration brings together a vaccine developed by the Malaghan Institute with a compound developed by IRL that increases the efficacy of the vaccine. The resulting vaccine would be injected directly into a tumour, prompting the patient's natural defences.

The project combines immunology and oncology expertise to develop a commercial vaccine.

Biotechnology Use in Agriculture: Collaborative Approach

Meat & Wool New Zealand and AgResearch are participants in an international project to map the sheep genome.

When fully completed the project is expected to provide significant benefits for both farmers and human health researchers, including the development of tools to help identify genes associated with important production, quality and disease traits.

Release of an initial assembly of the sheep genome was a step towards identifying DNA variants and allowed scientists to use the sequence directly for the first time.

7.3 Development and/or Regulatory Successes

Development and/or regulatory milestones provide well-defined intermediate measures of the sector's progress, particularly for many products and technologies which take many years to reach the market. These milestones include:

- Clinical trials by stage
- Field trials
- Pilot plant developments

Overall there has been considerable progress made in commercialising New Zealand biotechnology as shown in the table below:

Examples of Products in Development

Company	Product	Type	Description	Date and Stage of Advancement
AFT Pharmaceuticals	Analgesic	Health	Unique product for pain relief	A Phase III clinical trial has been completed in NZ
Pacific Edge Biotechnologies	Cx Bladder	Health	Bladder Cancer diagnostic	Clinical trials are currently underway in Japan
Aquaflow Bionomic	Green-crude	BioEnergy	Green-crude is an algae-derived biofuel	Green-crude produced from their proprietary processes to convert algae to next generation biofuel

Source: Public Domain

New Zealand Developed Drugs in Clinical Trials

Company	Commercialisation Partner	Drug	Indication	Phase
Auckland Cancer Society		Amsacrine	Leukemia	In Market
	Xenova	XR-11576	Cancer	PI
	Millenium	MLN-944	Cancer	PI
	Antisoma	DMXAA	Cancer	PII
	Pfizer	CI-1033	Cancer	PII
Proacta	N/A	PR-104	Cancer	PI
Industrial Research Ltd	BioCryst	BCX-1777 (Fodosine)	Leukemia	PII
	BioCryst	BCX-4208	Cancer	PII
Protelix	N/A	Laszarin	Complications from diabetes	PIIb/PIII
Neuren	N/A	Glypromate	Complications from CABG	PIII (commencing end of 2006)
	The US Department of Defense	NNZ-2566	Traumatic brain injury	PII
Virionyx	N/A	PEHRG214	AIDS	PII
Antipodean Biotechnology	N/A	MitoQ	Parkinson's disease / hepatitis C	PII
Living Cell Technologies	N/A	DIABECELL®	Type 1 Diabetes	Phase I/IIa
CoDA Therapeutics	BioPacificVentures, Domain Partners, GBS Ventures	Nexagon®	Wound healing	Phase I
Malaghan Institute of Medical Research & Wellington Hospital	N/A	Dendritic Cell Vaccination and Temozolomide	Recurrent Glioblastoma Multiforme	Phase I
University of Auckland	Antisoma	DMXAA	Cancer	PIII

Source: Public Domain, Company Websites

7.4 Market introductions

Approximately 75 biotechnology organisations released new or significantly improved products or services over 2006-2007. This represents 44% of total organisations surveyed, a proportion that has remained relatively constant since 2005. Most impressive growth has been evident within the companies that introduced 1 to 2 new products over the period. Those not introducing new products during the two year period increased relative to the previous period, but at a slower rate than the number of companies. The data paints a positive picture of an industry growing quickly in size and in productivity.

New or significantly improved products and services in the last two years

Number of new or significantly improved products and services	Number of organisations (2005)	Number of organisations (2007)	CAGR% (2005-07)
Zero	69	90	12.3
1 to 2	30	45	22.5
3 to 10	21	24	6.9
More than 10	3	6	41.4

Note: Random rounded to base 3

Source: Statistics New Zealand

Key market introductions over the past two years are detailed in the table below:

Recent Examples of New Product Launches

Company	Product	Type	Description	Date and Stage of Advancement
Vital Foods	Phloe™	Food	Kiwifruit-derived digestive health aid	Underwent clinical trials and launched in NZ market Aug 2007
Manuka Health	MGO™ Manuka Honey	Food	Dietary Methylglyoxal, compound responsible for Manuka honey's unique and reliable antibacterial activity	Sept 2008 launch in UK & Ireland
Pharmazen	Collamex™	Health care	A product specifically targeted at the hair care industry	During 2008 commencement of sales into China
AgResearch	Genomnz™ Facial Eczema (FE) testing service	AgBio	A DNA marker testing service for FE	Launched Nov 2008
BrainZ Instruments	RecogniZe™	MedTech	Bedside brain monitoring technology	Launched in Europe at International conference in Jan 2008

Source: Public Domain

Section 8:

RESEARCH INSTITUTIONS

Highlights

- New Zealand's research institutions continue to play a critical role in the continued growth and development of New Zealand's biotechnology sector
 - Biotechnology activity in research institutions is dominated by New Zealand's Crown Research Institutes. Each specialises in a field of research such as forestry, pastoral research or industrial research
 - Significant levels of high quality biotechnology research is conducted by the higher education sector in all of New Zealand's 8 major universities, 5 of 8 Centres of Research Excellence and 6 niche research institutes, including the Liggins Institute and the Malaghan Institute of Medical Research
 - Expenditure on biotechnology, number of employees, and the number of institutions engaged in biotechnology activities has remained relatively constant
 - Research institutions have made a number of significant contributions in the field of biotechnology. Examples include:
 - A new state of the art centre for the production and innovation of omega 3 oil emulsion with enhanced bioavailability was opened in Marton through a collaboration between Massey University, the Riddet Institute, and Speirs Nutritionals
 - A collaboration between IRL and Victoria University is undertaking work to passively monitor the heartbeat of unborn babies. The research aims to create technology that separates foetal heartbeats from interfering sounds such as the mother's heartbeat, helping to reduce the need for repeated use of ultrasound on unborn babies
 - The Malaghan Institute of Medical Research's cancer vaccine platform was expanded in 2008 to include clinical trials against brain tumours (glioblastoma multiform)
 - The number of postgraduate degrees in biological science and health grew from approximately 500 in 1999 to almost 700 in 2006
 - The Masters in Bioscience Enterprise programme piloted at the University of Auckland, is an innovative cross-facility programme working closely with industry, to produce commercially-savvy science graduates
 - Business incubators complement the research institutions by providing a variety of support structures as well as physical premises as an important stepping stone towards commercialisation for a number of the emerging biotechnology companies.
-

Largely supported by the New Zealand Government, New Zealand's research institutions play an essential role in the continued development and success of the biotechnology industry and ultimately in New Zealand's transformation into a knowledge-based economy.

Comprised of the Crown Research Institutes (CRIs), Universities, the Centres of Research Excellence (CoREs), and other non-Government research institutions, each has a particular role to play in the continued progress and development of the biotechnology sector:

- The eight publicly owned CRIs sustain research capability and infrastructure in areas of strategic importance to NZ and that can deliver benefit to NZ.
- The higher education sector is supported by Government RS&T and education funding, and plays an important role in building the current and next generation of scientists, in addition to contributing significantly to research output.
- The Centres of Research Excellence (CoREs) are designed to encourage the development of world-class research in New Zealand by providing incentives for researchers in the tertiary education sector.
- Other research institutions are comprised of (1) industry-linked research institutions that have strong industry relationships and carry out a range of research functions, and (2) privately funded research institutes which tend to focus on specific areas of expertise.
- Business incubators complement the research institutions by providing a variety of support structures as well as physical premises as an important stepping stone towards commercialisation for a number of the emerging biotechnology companies.

The purpose of this section is to highlight the contribution and capabilities of New Zealand's research institutions.

8.1 Overview of Research Institutions

Research institutions represent a significant proportion of the biotechnology sector in New Zealand. The majority of the research institutions are of significant scale with over 90% having more than 100 employees. The number of research institutions remained constant between 2004 and 2007, reflecting structural stability in this part of the biotechnology sector as well as its generally longer-term focus.

8.2 Crown Research Institutes (CRIs)

Crown Research Institutes (CRIs) were established in 1992 with the primary purpose of undertaking research for the benefit of New Zealand. Each CRI is built around a productive sector of the economy, a grouping of natural resources or a particular public-good task, enabling each to have a clearly defined purpose and customer base.

The Government owns Crown Research Institutes (CRIs) to ensure that New Zealand maintains a critical mass and capability in strategic areas of science that are of long-term importance to New Zealand.

The CRIs are companies (registered under the Companies Act 1993) owned by shareholding Ministers, namely the Minister for CRIs and the Minister of Finance, under the Crown Research Institutes Act 1992. Each CRI has an independent board appointed by shareholding Ministers. All CRIs have an Output Agreement with the Minister of RS&T which sets out how they allocate the CRI Capability Fund to support capability.

Within a small economy such as New Zealand's, it is vital that both the Government and local industry have access to capable RS&T institutions that are resident in New Zealand. CRIs are required to deliver a return to their shareholders, which encompasses both a return on equity and also the contributions that CRIs make to the Government's broader economic, environmental and social goals, including maintaining scientific infrastructure and capability.

The CRIs have made significant contributions to the biotechnology sector over the past several years. These contributions are included in the following table.

New Zealand Crown Research Institutions (CRIs)

Research Institution	Operating Revenue	Est. % of Income From Biotech	Key Biotech Research Areas	Major Developments
AgResearch	\$149m	49	<p>Pastoral sector research with improved on-farm productivity enhancement, including:</p> <ul style="list-style-type: none"> Animal genomics Ovulation, growth and development and reproductive technologies Forage genomics and variety improvement 	<p>Development of the Best Practise Management Tool, a web-based decision support tool based on the premise that 'no one size fits all', providing farmers with the most cost-effective mitigation options for specific concerns eg. Nitrogen leaching, phosphate loss, faecal contamination, GHG emissions</p> <p>New areas of science in sheep production are being studied including stem cell biology, epigenetics, and genetic testing, to address meat quality and tenderness issues – and in an attempt to tailor the final product to the consumer</p> <p>A ForST funded partnership between AgResearch, Deer Industry NZ, and Velvet Antler Research NZ has created a product from deer velvet extract that promotes accelerated wound healing. RepairRx has recently completed pre-clinical trials overseas.</p>
Plant & Food Research	\$120m (EST)	N/A	<p>Breeding – Fruit, vegetables, grains</p> <ul style="list-style-type: none"> Molecular biology Genetic mapping Marker assisted selection Bioinformatics Metabolic profiling <p>Food and Health</p> <ul style="list-style-type: none"> Nutrigenomics Gastonomics 'Nature Identical' fruit flavours Bioassays <p>Postharvest</p> <ul style="list-style-type: none"> Biosensors and "intelligent" packaging Hi-Tech storage – Controlled and Modified atmosphere Ripening controls and monitoring <p>Sustainability and Bioprotection</p> <ul style="list-style-type: none"> Non-chemical pest and disease control – biocontrols, pheromone based systems, sterile insect technique 	<p>Half year to December 08</p> <p>Plant & Food Research was formed in December 2008 through the merger of HortResearch and Crop & Food Research.</p> <p>\$13 in new funding was secured from the Foundation for Research Science and Technology (FRST) for programmes to maximise the value of New Zealand Seafood harvests. Projects include: new marine products for use in nutraceuticals, food ingredients and cosmetic industries; increasing export value for fresh and whole seafood and adding value to the cultured shellfish industry.</p> <p>Over \$9m was invested by FRST in Plant & Food Research-led projects in the horticultural and human health space. Research programmes include: fruit breeding, low impact disease and insect control, gastronomics, maori organic horticulture and environmental impact assessment.</p>

Research Institution	Operating Revenue	Est. % of Income From Biotech	Key Biotech Research Areas	Major Developments
Scion (Forest Research Institute)	\$41m	30	Commercial forestry R&D (with CSIRO's Forestry and Forest Products Division) Sustainable consumer products, including bioenergy research Biomaterials research	Completed a situation analysis and feasibility report on New Zealand's biomass resources that identified promising options for non-food bioenergy production now and into the future Significant operational benefits achieved by New Zealand sawmillers through Scion's A-grader technology – a demonstration model has been installed in a North American sawmill as a further step towards entering this market Scion's GE trial has been completed and was the most comprehensive independent scientific field trial of genetically modified trees in New Zealand. The trial revealed no evidence of deleterious environmental impact from the trees and no evidence of genes being transferred from the trees to other organisms.
Industrial Research Ltd	\$57m	13	Focused on a broad range of industrial technologies that are suitable for commercialisation, including biomedical devices, carbohydrate and glycotherapeutic drug targets and manufacture, and bioactives	A collaboration between IRL and Victoria University is breaking new ground with its work aimed at passively monitoring the heartbeat of unborn babies. The research aims to create technology that separates foetal heartbeats from interfering sounds such as the mother's heartbeat, helping to reduce the need for repeated use of ultrasound on unborn babies A joint venture between IRL and a local subsidiary of General Cable Superconductors Limited aims to have a locally manufactured high temperature superconductor (HTS) available to the global market within two years.
Environmental Science and Research (ESR)	\$51m	12	Provides science solutions in public health, environmental health and forensic services. Biotechnology applications include food safety, especially monitoring food-borne pathogens, and understanding relationships between environment and human gene expression	Completion of the installation and validation of robotics for DNA extraction from crime scene samples, and for DNA amplification, freeing up experienced staff to focus on case interpretation rather than highly repetitive manual tasks A new 'Epimotion' machine means influenza specimen samples can be analysed in hours not days, the machine is also capable of screening for a range of other diseases In consultation with council water managers ESR developed a web-based tool to help track sources of faecal contamination in surface water.

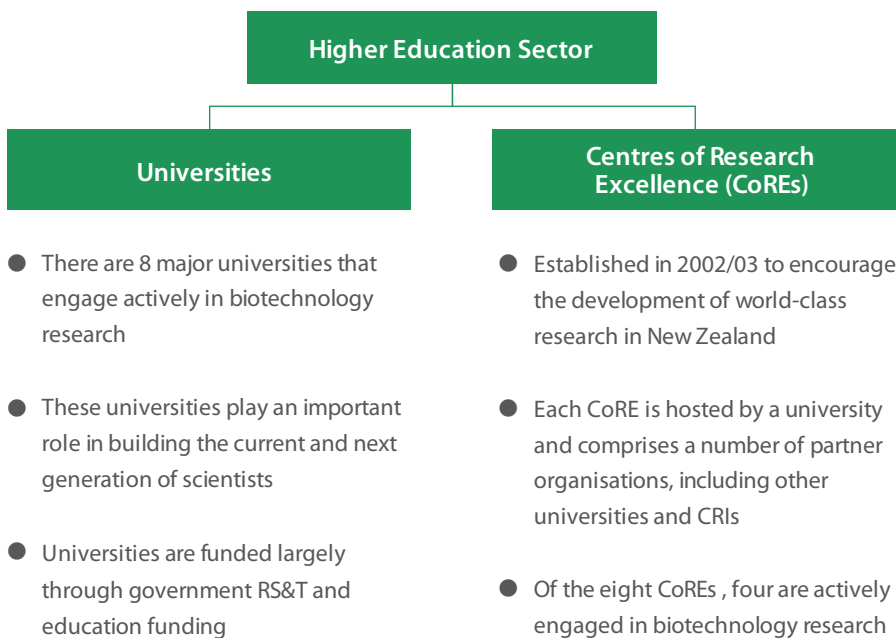
Research Institution	Operating Revenue	Est. % of Income From Biotech	Key Biotech Research Areas	Major Developments
Landcare Research	\$56m	11	Specialises in the sustainable management of resources for production, conservation, business and the community. This includes understanding New Zealand biodiversity to develop tools for pest control and ecosystem management	<p>Sirtrack, LandCare Research's wholly owned company specialising in wildlife tracking solutions increased sales by 37% in 2008. Critical to the growth were 3 products; GPS Argos (which enables GPS location information to be transferred via satellite), Micro GPS (a tiny 22 gram GPS unit), and Fastloc (a GPS unit designed for difficult applications – such as tracking of marine mammals)</p> <p>Landcare Research facilitates an expanding network of biodiversity sanctuaries as part of its Sustaining and Restoring Biodiversity Programme. Sanctuaries provide a key pathway for up-take of science such as pest management, and monitoring, biodiversity assessment, conservation genetics, and enhanced methods for captive breeding.</p>
National Institute of Water and Atmospheric Research (NIWA)	\$119m	7	Provides environmental research and services in atmosphere and climate, coast and oceans, freshwater, fisheries, and aquaculture. Biotechnology applications include drugs and nutraceuticals from marine sources and bioactive materials for the marine industry	<p>Established new operational flood forecasting trials – applying advances in science to reduce property damage and save lives</p> <p>New Zealand's Polar Year voyage of discovery on RV Tangaroa – expanding fundamental knowledge to secure a sustainable future for the planet</p> <p>Innovative research on Orange Roughy – providing a scientific basis for sustainable fisheries management</p> <p>New climate change projections for New Zealand, and associated guidance for local government.</p>
Geological and Nuclear Sciences (GNS)	\$54m	3	New Zealand's largest provider of geoscience and isotope science research and consultancy. This includes exploring and describing the EEZ for biological resources and extremophile research with industrial and environmental applications	<p>GNS estimated the petroleum potential of New Zealand's deepwater sedimentary basins to be some tens of billions of barrels – analysis of Deepwater Taranaki and Great South basins has helped to attract some of the world's biggest exploration companies to New Zealand</p> <p>GNS's water dating laboratory has been confirmed as the most accurate of 70 such laboratories in the world. Water dating is an important indicator of groundwater quality and is crucial in the sound management of aquifers</p> <p>Production of a world first ground-shaking amplification map of New Zealand showing how different areas are affected by this hazard depending on their geology.</p>

8.3 Higher Education Sector

The higher education sector undertakes a sizeable proportion of New Zealand's biotechnology research activity. In 2005, higher education organisations represented approximately 20% of total expenditure on biotechnology. Funding comes from both Government RS&T and education funding as well as private sector sources. This investment provides for the development and maintenance of research capability in New Zealand and underpins the provision of quality tertiary education.

Universities are Tertiary Education Institutions and are governed by the Education act 1989. Each TEI is administered by a Council which is responsible for establishing and implementing a Charter approved by the Minister of Education. A key element of these Charters is to "strengthen research, knowledge creation and uptake" and foster the close relationship between research and teaching

The higher education sector is comprised of universities and Centres of Research Excellence (CoREs):

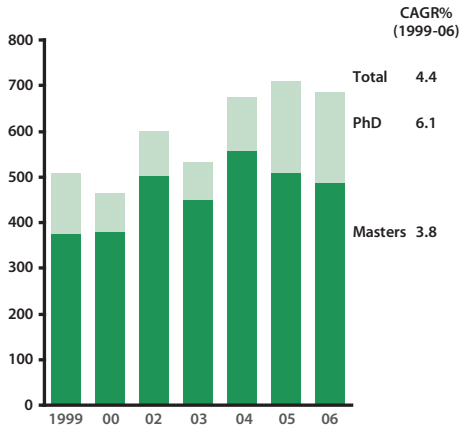


The universities comprise the majority of the higher education sector. They continue to make significant and invaluable contributions by conducting breakthrough research and training New Zealand's next generation of scientists.

Two of New Zealand's universities are ranked in the top 200 in the world in "The Times Higher Education Supplement" Top 200 Universities for 2008: the University of Auckland was ranked 65 and the University of Otago at 186=.

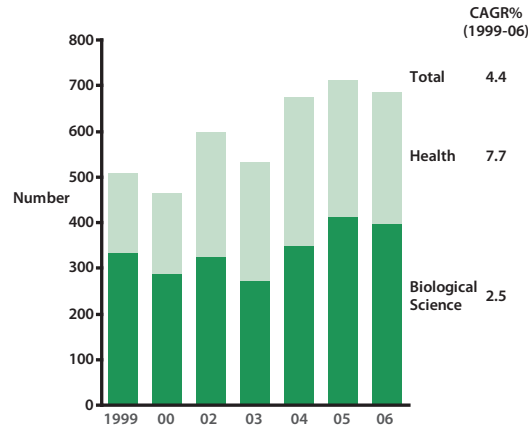
Postgraduate students are a strong driver of basic research activity, particularly in universities. The level of postgraduate graduations represents both a completion of their research as well as a highly skilled employment base that the industry will require as it grows. The number of postgraduate degrees in biological science and health grew from approximately 500 in 1994 to almost 700 in 2006.

New Zealand Postgraduate Degrees Awarded in Biological Sciences and Health by Type (1999 - 2006*)



Note: *2001 data not available
Source: New Zealand Vice Chancellors Committee

New Zealand Postgraduate Degrees Awarded in Biological Sciences and Health by Subject (1999 - 2006*)



Note: *2001 data not available
Source: New Zealand Vice Chancellors Committee

New Zealand Universities Involved in Biotechnology

Research Institution	Location	Primary Application Area(s) (related to biotech)	Major Developments
Auckland University of Technology	Auckland	Biomedical Sciences	KODE™ an AUT spin-off company has developed CSL Securacell™, a product for enhancing the safety of blood supply and blood transfusion processes. This product has been launched in the Australian market and represents the world's first multi purpose Quality Control System for immunohaematology laboratories. Similar products are about to be released in the EU and USA, pending regulatory approval.
Lincoln University	Christchurch	Environmental Plant biotech	2007: Substantial sales growth of eco-n™, a patented product licensed to Ravensdown, which reduces nitrate leaching and nitrous oxide greenhouse gas emissions from dairy pasture soils. 2007: Commercial release of Cold-Tolerance Gene-Marker Test for lamb survival. Now sold in five countries under the Lincoln University brand 2008: increasing the capacity of the New Zealand Biotron, the southern hemisphere's only such above and below ground controlled environment facility 2008: increased sales growth of Sentinel ^(R) , a registered biopesticide licensed through Agrimm Technologies Ltd for use against Botrytis diseases of grapevine and other fruit crops 2008: Beta testing and capital raising for Scitox, a biosensor for monitoring toxicity in watercourses and waste streams.

Research Institution	Location	Primary Application Area(s) (related to biotech)	Major Developments
Massey University	Palmerston North	Animal biotech Plant biotech	July 2007: A new state of the art centre for the production and innovation of omega 3 oil emulsion with enhanced bioavailability was opened in Marton through a collaboration between Massey University, the Riddet Institute, and Speirs Nutritionals.
University of Auckland	Auckland	Biomedical sciences Animal biotech	Jan 2008: EBONZ formed to exploit the technology and models from the Bioengineering Institute into tools and services to improve the prognosis of orthopaedic surgery and implant design Novel drug therapies developed at the University of Auckland's Maurice Wilkins Centre have resulted in a spin off company, Pathway Therapeutics Ltd. This company has raised US\$9.6m to develop an intellectual property portfolio, hire research staff and take potential anticancer therapeutics through to preclinical and clinical trials.
University of Canterbury	Christchurch	Animal biotech Bioactives	Animal Biotech: Two related ventures are being developed with Crop and Food Research. The Higher Value Seafoods programme is developing processing methods to extend the shelf-life of both finfish and shell fish post-capture, while the Wildfish 2020 programme is investigating harvesting technologies to increase the quality of fish at point of capture. These innovations are being trialed in 2008/2009 and are of significance to the fishing industry Bioactives: The Biomolecular Interaction Centre (BIC) at the University of Canterbury was founded in 2007 after being awarded funding from the Innovation and Development Fund from the Tertiary Education Commission (TEC). BIC was established to concentrate regional infrastructure around an area of niche specialisation and drive cross-disciplinary research in the area of biotechnology.
University of Otago	Dunedin, Christchurch, Wellington	Biomedical sciences Animal biotech	License to Biosite of a diagnostic marker for bone growth developed at the Christchurch School of Medicine (2007) Beginning of a large scale clinical trial for a diagnostic/prognostic marker for bladder cancer by publically listed University of Otago spinout Pacific Edge Biotechnology (2008) Signing of distribution agreement with Frutarom Ltd for probiotics developed in conjunction with the University of Otago by BLIS Technologies Ltd (2008).
University of Waikato	Hamilton	Bioprocessing Environmental	ZyGEM Corporation Limited was set up in 2005 by WaikatoLink, the commercial arm of the University of Waikato, to commercialise DNA extraction methods developed in collaboration by University of Waikato and Auckland University researchers. The company, which has offices in New Zealand and the US, is backed by venture capital firm Endeavour Capital and private investors.
Victoria University	Wellington	Bioprocessing Proteomics	Development of a novel biomaterial as a substitute for bones and teeth Joint project with IRL and Malaghan on a cancer vaccine Development of nanoparticles for biomedical applications, such as imaging or separation kits New concept for IVF therapy through Victoria's reproductive biology expertise.

In the 2006/07 funding round six existing Centres of Research Excellence (CoREs) and one new one, the Riddet Institute at Massey University, received funding for a further six years. One of the existing CoREs, the New Zealand Institute for Mathematics and its Applications received wind-down funding until 2011.

New Zealand Centres of Research Excellence (CoREs) Involved in Biotechnology

Research Institution	Location	Primary Application Area(s) (related to biotech)
Allan Wilson Centre for Molecular Ecology and Evolution	Massey University (Palmerston North)	Genomics and biodiversity supporting biodiscovery
Centre for Molecular Biodiscovery	University of Auckland	Cell biology, Proteomics, Genomics, Development of new biotech and research tools
National Centre for Advanced Bioprotection Technologies	Lincoln University (Christchurch)	Biosecurity for plant-based industries and natural ecosystems
National Centre for Growth and Development	Auckland	Neo-natal development and prematurity (especially the brain), neurodegenerative disease
Riddet Institute	Palmerston North	Biomaterials and digestive physiology relating to nutrient absorption and metabolism
MacDiarmid Institute for Advanced Materials and Nanotechnology	Wellington	Biological applications for nanotechnology, including investigating the immobilisation of mammalian cells and the fabrication of nanoscale chemically-sensitive surfaces for biological recognition

8.4 Other Research Institutions

Other non-Governmental research institutions are comprised of two main types of organisations:

- **Industry-linked research providers:** These organisations have capabilities in research and technology transfer, often referred to as extension in the primary sector, that individual companies may not be able to manage. They also carry out a range of research functions and have strong industry links. They receive funding from a number of sources, including industry review mandated by legislation (which accounts for the bulk of the funding), commercial income and some Foundation for Research, Science and Technology (FRST) income. These include organisations such as DairyNZ, Seafood Innovations, Meat and Wool NZ and Deer Industry NZ
- **Private sector organisations:** These organisations rely on funding from corporate, charitable and contestable government sources. They also focus on specific areas of expertise, such as medicine or particular science areas. They include organisations such as the Malaghan Institute and the Cawthron Institute.

These research institutes continue to make considerable progress and contributions to the New Zealand biotechnology sector. Examples are included in the following table.

Other New Zealand Research Institutes Involved in Biotechnology

Research Institution	Location	Primary Application Area(s) (related to biotech)	Major Developments
DairyNZ	Hamilton	Dairy productivity, Sustainable farm systems, Methane reduction	Participating in a Pastoral Genomics and Pastoral Greenhouse Gas Consortium Conducting trials looking at phenotypic traits in cows, e.g. a food conversion trial is underway.
Livestock Improvement Corporation (LIC)	Hamilton	Dairy herd genetics, genomic based selective breeding, milk productivity, and quality analysis, advanced reproduction technology	September 2006: LIC launched a PCR based diagnostic test for Bovine Viral Diarrhoea (BVD). Initial uptake of the test exceeded expectations and subsequent growth in demand has consistently topped 25% per annum. August 2007: LIC launched the test day model to the herd testing business to give farmers the option of reducing the labour and time required for herd testing. Technological and computing advances mean LIC is able to offer farmers similar information to herd testing for half the effort October 2008: LIC launched DNA screening and advanced genetic algorithms to estimate the genetic worth of sires. The technology delivers unparalleled levels of genetic gain to the dairy industry.
The Liggins Institute	Uni of Auckland	Growth, development and metabolism with respect to biomedicine and animal agriculture Development of predictive diagnostics and food and pharmaceutical based interventions to manage or reverse adverse developmental programming Nutrition and human health Developmental neurobiology and cancer biology related to pharmaceutical development Experimental biology and epigenetics	BraiNZ is now likely to be taken over by GE Healthcare Renewal of the National research centre for Growth and Development – a Centre of Research Excellence which the Liggins headquarters Neuropharmaceuticals in clinical trialling through Neuren Pharmaceuticals Establishment of a major new international research consortium – EpiGen – for development of commercialisation of epigenetics based products Breast cancer leads licensed to partners Establishment of a major new collaboration with the National University of Singapore and Singapore Institute of Clinical Sciences.
The Malaghan Institute of Medical Research	Victoria Uni (Wellington)	Asthma, Cancer, Multiple Sclerosis, Arthritis, infectious diseases	2008: Cancer vaccine platform expanded to include clinical trials against brain tumours (glioblastoma multiform).
The Cawthron Institute	Nelson	Environmental monitoring tools, marine biosecurity, microbial source tracking, biomonitoring Seafood safety, marine biotoxin detection Algal technologies, isolation and production of novel enzymes and bioactive compounds from aquatic micro-organisms, biosensors Aquaculture, gene technologies, probiotics, cryopreservation, selective breeding	Development of Microbial Source Tracking (MST) techniques to determine source of bacterial contamination in freshwater environments Successful cryopreservation of shellfish eggs – a world first in aquatic species.

8.5 Business Incubators

Business Incubators are organisations that provide a range of support services to ensure that new ideas within emerging companies have every chance of commercial success. Often associated with strong links to a local university, these organisations are coordinated nationally through Incubators New Zealand (<https://www.incubator.org.nz/>) and attract funding through a number of sources including NZTE, local councils, associated universities and industry. These centres provide the supportive stepping stone that can be crucial for newly formed biotech companies as they begin commercial activities.

Business Incubators supporting Biotech firms

Incubator	Location	Biotech related Tenants
BioCommerce Centre	Palmerston North	Grasslanz, Slipstream Automation, Favougene, AgEnergy
Innovation Waikato Park Incubator	Hamilton	Innovation Waikato Park no longer operates as an incubator but supports a number of more mature businesses: Bio Vittoria, Cardinal Biosciences Ltd, eCogent, NZ Biotechnologies, ZyGEM, AAT, Merinova Ltd., Nupharm Laboratories, Sensortec
AUT Technology Park	Auckland	Opas
Centre for Innovation	Dunedin	BLIS Technologies, Immune Solutions Ltd., Pacific Edge Biotechnology, Australo Ltd, Orasphere, Photonic Innovation Ltd, Seperex Nutritionals Ltd, Spinal Cord Soc NZ Inc, World45 Solutions Ltd
The Icehouse	Auckland	Sunshower, ULearnCare
e-centre Massey	Auckland	COHFE, DHI
Creative HQ	Wellington	The OH! Group
Canterbury Innovation Incubator	Christchurch	Educational Interactive, Perennial, Crop Logic
Upstart Incubator	Dunedin	Innovative Learning

Section 9:

PUBLIC POLICY

Highlights

- The New Zealand Government continues to be a strong supporter of the biotechnology sector. The Biotechnology Taskforce that was set up under the Government's Growth and Innovation Framework has been an important catalyst for significant progress. Key advances which can be related back to the Taskforce include, amongst others:
 - creation of a unified industry body, NZBIO, which in turn has played a pivotal role creating a community of practice around the sector
 - ongoing changes in tax legislation, such as the carry forward of tax losses
 - expansion of the New Zealand Venture Investment Fund (VIF) through the introduction of the Seed Co-investment Fund (SCIF) and the increased investment in the Venture Capital Programme
 - creation of the Australia New Zealand Biotechnology Partnership Fund (ANZBPF) designed to facilitate and accelerate trans-Tasman collaboration
 - The Government provides funding for biotechnology to the private sector, public sector and higher education sector through a number of funds, thus playing an important role in addressing what is considered to be one of the most important issues facing the industry
 - in addition to direct funding of public and private sector biotechnology programmes, Government funding includes a number of initiatives designed to achieve broader industry goals such as the growth of a vibrant venture capital sector and the promotion of trans-Tasman collaborations
 - Significant developments have also been made in terms of New Zealand's regulatory environment. In general, the regulatory environment needs to address a broad set of issues, ranging from genetically modified organisms to xenotransplantation. Increasing harmonisation with Australian (and global) regulations is expected to enhance the increasingly fluid exchange of funds and resources and innovation between these two countries.
 - Other public policy initiatives set to have a significant impact on the growth and vibrancy of the New Zealand biotechnology sector include:
 - Tax legislation becoming more favourable to biotechnology companies and investors in biotechnology companies, largely due to changes in allowances for carry forward losses and proposed changes for taxation of foreign based investment
 - The Ministry of Research, Science and Technology produced the Biotechnology Research Roadmap in March 2007. This document clearly sets out the Government's future research directions for biotechnology. A Food Research Roadmap is also in preparation.
-

The Government recognises the strategic importance of the biotechnology sector to New Zealand and has played an active role in setting strategies and policies over the past several years. The Government's New Zealand Biotechnology Strategy - released in May 2003 - sets out a vision and direction for the development of biotechnology in New Zealand. Its theme is "a foundation for development with care" and is concentrated in three main areas:

- Community engagement - building understanding about biotechnology in the community and encouraging dialogue
- Sector growth - enhancing economic and community benefits
- Regulation - providing robust safeguards while allowing innovation

A 2008 survey by NZBIO of its members highlights the relative importance of various issues facing the biotechnology industry and regulators. The survey found that:

- Access to talent is the most important issue to biotechnology organisations, followed by access to funding
- Proximity to world class research centres and the availability of entrepreneurs have become critical issues to biotechnology organisations in the last two years

NZBIO/Grow Wellington Biotechnology Industry Survey: Priority Capabilities for New Zealand Biotechnology (2008)



Source: NZBIO/Grow Wellington

The Biotechnology Taskforce was set up under the Government's Growth and Innovation Framework (GIF) released in early 2002. The goal of this Framework was to identify ways in which to return New Zealand to the top half of the OECD in GDP per capita rankings. Biotechnology was highlighted in the GIF report as one of three key industries which, if developed correctly, has the potential to have an enormous impact on New Zealand's economy. The Biotechnology Taskforce was established to examine what public policy could do to support the industry:

- In 2003 the Biotechnology Taskforce outlined its initial report, an ambitious yet achievable 10-year growth strategy and a detailed 28 point framework for action. The Taskforce report had recommendations for both Government and Industry. Although New Zealand already had world-class expertise across biotechnology fields as diverse as medical research and horticulture, the Taskforce recognised that in order to make a substantial contribution on the international stage New Zealand needed to develop a greater critical mass.
- The progress over the last several years is evidence of a coherent strategy for growing the industry well into the future. The implementation of the Taskforce's recommendations and the parallel Biotechnology Strategy has contributed significantly to the development of the sector including establishment of a proof of concept fund, increased commercialisation from CRIs, and streamlining of regulatory processes.

The results of changes due to the Taskforce recommendations, in addition to other policy settings, are summarised in the sections below. The purpose of this section of the report is to describe the public policy environment and developments along three dimensions:

- Government priorities and funding
- Regulatory environment
- Taxation and other public policy and regulatory developments

9.1 Government Priorities and Funding

The Government has a significant impact on setting the direction, growth trajectory and short and long-term investment decisions in the biotechnology industry. According to the Ministry of Research, Science and Technology, "New Zealand has limited science resources that need to be allocated carefully to ensure we deliver benefit to New Zealand, long term and short term, as well as help make our way in an increasingly competitive global marketplace. The Government's directions for research are reflected in the type of research supported, how it is expected to be carried out, and the level of investment..."⁷

The Government's biotechnology research investments play a vital role in achieving the Government's high level economic transformation goal. A key area of investment in this regard is the primary sector, which accounts for a significant proportion of New Zealand's exports and is also the basis for many other sectors such as manufacturing. Given the importance of the primary sector, even small productivity gains translate into significant economic returns. Over the long term New Zealand also recognises the need to diversify the economic base by creating sustainable economic advantages in new areas of activity. Biotechnology research investment in, for example, a number of biomedical and drug discovery research projects are maturing towards commercialisation and have the potential to add substantial value to the New Zealand economy in the future.

As seen in Section 6 (Financing and Deals), Government funding for biotechnology was approximately \$250m across various areas of the biotechnology industry. This funding was invested through a number of different vehicles, each serving a particular purpose. As seen in the table below, Government investment in these funds has increased significantly over that period.

Largest Government Funds Supporting Biotechnology

Government Goal	Key Funds	Funding 2007/2008 (\$m)*	Increase on 2005/2006 (%)	Current Trends or Emphasis
Knowledge	Marsden Fund (RS&T)	37.9	30	Increase focus on research excellence in the tertiary sector.
	New Economy Research Fund (RS&T)	73.0	29	
	Centres of Research Excellence (Education)	25.8	NA	
	Performance Based Research Fund (Education)	16.3	NA	
Training and Development	CRI Capability Fund (RS&T)	50.6	99	More direct support for long-term skill and infrastructure needs and assets.

Government Goal	Key Funds	Funding 2007/2008 (\$m)*	Increase on 2005/2006 (%)	Current Trends or Emphasis
Increasing Industry Competitiveness	Research for Industry (RS&T)	215.8	31	Contribution to Government strategies and sector engagements.
Supporting Commercialisation of Research	Pre Seed Accelerator Fund (RS&T)	9.2	115	Linkages and partnerships with Industry
	New Zealand Venture Investment Fund (VIF) which includes the Seed Co-investment Fund (SCIF) and the Venture Capital Programme (RS&T)	NA	NA	New alternatives to grant-based funds, including equity and capital based funds.
	Technology for Business Growth (RS&T)	32.8	67	
Enhancing the Understanding and Management of the Environment	Environmental Research (RS&T)	86.4	16	More research orientated to environmental management. NZ participation in global science issues.
Improving the Health of New Zealanders	Health Research (RS&T)	63.1	68	Alignment to national health needs and support for uptake of health research.
Enhancing the Economic Development of NZ via Biotechnology Initiatives	Australia New Zealand Biotechnology Partnership Fund (ANZBPF)	4.0	25	Specifically for biotechnology. Programme has been extended Designed to facilitate and accelerate trans-Tasman biotechnology industry collaboration.
	Growth Services Fund	5.8*	-54	Assisting small to medium sized enterprises (SMEs) with potential for high growth to undertake significant projects and initiatives that would assist them in realising their full growth potential Increasing fund allocation to biotechnology companies (20% of total 07/08).
	Enterprise Development Grant-Capability building	2.7*	-46	Assists individuals, businesses, and entrepreneurs to gain additional business skills and access external expertise and assistance in developing business projects.
	Enterprise Development Grant-Market Development	40.5	40	Aim is to encourage the entry of more New Zealand firms into global markets Now focussing on longer term investments to successful applicants i.e. multi-year grants.

*Actual not forecast funding

In addition to the major funds listed above, the New Zealand Government has several additional funds that support international collaboration and linkages. These funds play a critical role in supporting the biotechnology sector by encouraging and enabling international linkages which underpin R&D and commercialisation activities:

- International Investment Opportunities Fund (\$7.7m investment in 2005/06, FRST)
- International Science and Technology Linkages Fund (\$2.4m investment in 2005/06, MoRST/RSNZ)
- World Class New Zealand programme (NZTE)

Also, the Government invests significant resources through its Departments and Ministries with dedicated personnel to support the sector. For example, the Ministry of Research, Science and Technology (MoRST) provides policy advice on the Government's RS&T investment and to encourage innovation and commercialisation. The biotechnology sector is one of the major priorities that MoRST is focused on, and a team dedicated to biotechnology is working to build community engagement and provide guidance on regulatory issues.

New Zealand Trade and Enterprise (NZTE) is the New Zealand Government's national economic development agency. Through NZTE's Biotechnology Sector Engagement Strategy, NZTE aims to accelerate the growth and development of New Zealand's biotechnology sector by supporting company growth, lifting New Zealand's international profile for biotechnology, stimulating the inward flow of investment into the sector and accelerating the consolidation of sector capabilities and infrastructure.

9.2 Regulatory Environment

Strong public interest and concern in biotechnology issues results in the need for a constant focus on transparency and best regulatory practice. The biotechnology industry is regulated through a number of bodies and mechanisms. Regulation plays an important part in the direction and development of the biotechnology sector, in particular in the following areas:

- Importation and development of "novel" foods
- Research involving genetic modification, other new organisms and hazardous substances
- Development and use of human medicines, therapeutics and medical devices

A number of regulatory bodies govern the research and commercialisation of biotechnology related products (see Table below for acronyms):

- Research that involves animals or humans must gain approval from the appropriate approved Ethics Committee. Research that imports or aims to generate GMOs (other than human) must have approval from ERMA, either directly, or through an IBSC if determined to be low risk
- Agricultural compounds and veterinary medicines must gain approval from the ACVM group, and if the compound is or contains a live GMO or a hazardous substance must also seek ERMA approval
- The introduction of a new food crop that is a GMO or a new species requires ERMA approval before being field tested or released and going to market
- Importation of animals, plants and microorganisms require a permit to import issued by Biosecurity New Zealand. Before such a permit can be issued there must exist a relevant Import Health Standard
- The introduction of a novel food product for consumption must be approved by FSANZ
- New medicines that require clinical trials in New Zealand require that the clinical trial be examined by GTAC and/or SCOTT as well as seeking approval from an approved Ethics Committee. The Director General of Health approves clinical trials. Applications to market a new medicine are currently assessed by MAAC/MEDSAFE with the Minister of Health approving the marketing of new medicines.

Major New Zealand Regulatory Bodies for Biotechnology

Regulatory Body	Governing Act	Focus
Food Standards Australia New Zealand (FSANZ)	Food Standards Australia New Zealand Act	Sets food standards for Australia and New Zealand. Develops food standards for composition, labelling and contaminants, including microbiological limits, that apply to all foods produced or imported for sale in Australia or New Zealand.
Agricultural Compounds and Veterinary Medicines (ACVM) Group	Agricultural Compounds and Veterinary Medicines Act	ACVM is responsible for the regulatory control of agricultural compounds (veterinary medicines/plant compounds), and their importation, manufacture, sale and use on behalf of the New Zealand Food Safety Authority.
Environmental Risk Management Authority (ERMA)	Hazardous Substances and New Organisms (HSNO) Act	Makes decisions on applications to introduce or create hazardous substances or new organisms including genetically modified organisms (GMOs).
Institutional Biological Safety Committee (IBSC)	Hazardous Substances and New Organisms (HSNO) Act	An IBSC is convened by an institution that is delegated the decision-making power on low-risk genetically modified organisms under the 'rapid assessment' provisions of the HSNO Act. These institutions are typically universities or CRIs.
New Zealand Medicines and Medical Devices Safety Authority (Medsafe)	Medicines Act Misuse of Drugs Act	Medsafe regulates products that have a pharmacological effect and are used in humans for a primarily therapeutic purpose.
Medicines Assessment Advisory Committee (MAAC)	Medicines Act	MAAC is a committee of clinicians and other specialists appointed by the Minister of Health. They review drug information and decide whether a product is safe and efficacious, and what the indications of a drug should be.
Standing Committee on Therapeutic Trials (SCOTT)	Health Research Council Act Medicines Act	SCOTT is a committee of specialists from a range of health fields that assess the design of clinical trials for new medicines. Recommendations are passed on to the Director General of Health.
Gene Technology Advisory Committee (GTAC)	Health Research Council Act Medicines Act	Assesses the scientific merit of New Zealand applications to produce new medical therapies through the transfer of genes from another species to humans, and between species Studies involving the introduction of nucleic acids, genetically manipulated micro-organisms, or viruses or cells into human subjects are referred to the GTAC for evaluation rather than to SCOTT.
Approved Ethics Committee	Health Research Council Act	In addition to assessments by SCOTT and GTAC, any clinical trial must be assessed by a health and disability ethics committee. Health and disability ethics committees are accredited by the Health Research Council (HRC).
Advisory Committee on Assisted Reproductive Technology (ACART)	Human Assisted Reproductive Technologies Act	Established to formulate policy and advice specific to New Zealand about assisted reproductive technologies.
Ethics Committee on Assisted Reproductive Technology (ECART)	Human Assisted Reproductive Technologies Act	This committee is required to consider and determine applications for assisted reproductive procedures or human reproductive research and keep under review approvals previously given.
Approved Ethics Committee	Animal Welfare Act	Animal research must be approved by a committee that has been accredited by the National Animal Ethics Committee.
Biosecurity New Zealand	Biosecurity Act	Develops import health standards and issues import permits for organisms and other materials and products.
Pharmac	Crown Entities Act	Crown-owned pharmaceutical management agency.

There have been a number of recent initiatives and legislation that impact the regulatory environment in New Zealand. These are largely related to relatively recent developments in technologies such as genetic modification, stem cell research, and xenotransplantation.

Recent Initiatives in the Regulatory Environment in New Zealand

Recent Initiatives	Date	Description
Human Assisted Reproductive Technology Act	November 2004	<p>The HART Act establishes an advisory committee and an ethics committee</p> <p>The Advisory Committee on Assisted Reproductive Technology ("ACART") is established to provide advice to the Minister of Health on issues in relation to assisted reproductive procedures and human reproductive research. ACART is also responsible for providing guidelines to the Ethics Committee on Assisted Reproductive Technology ("ECART")</p> <p>ECART reviews applications to carry out human reproductive research and assisted reproductive procedures that are not established procedures.</p>
Human Tissue Act	2008	<p>This Act sets out guidelines and requirements for:</p> <p>Informed consent for the collection and use of human tissues</p> <p>Collection of tissues for therapeutic, education or research purposes</p> <p>Import, export and trade in human tissues</p> <p>The collection and use of human stem cells are covered by this Act.</p>
Patents Bill	Released for public comment in December 2005	<p>This Bill has proceeded to the Select Committee stage.</p> <p>This legislation will replace the Patents Act 1952.</p> <p>Major features include:</p> <p>The Patents Office will measure the novelty and inventive step of an invention against matters made public globally by any means</p> <p>An exclusion will cover: human beings and biological processes for their generation; diagnostic, therapeutic or surgical methods for their treatment of human beings; plant varieties; and inventions whose commercial exploitation is contrary to public policy or morality</p> <p>The ability to patent microorganisms so long as a sample of microorganism is deposited with a prescribed depository</p> <p>An exception for research or experimental work involving a patented invention.</p>
Plant Variety Rights Act Amendment Bill	Released for public comment in May 2005	<p>This Bill has not yet proceeded to the Select Committee stage.</p> <p>This legislation will amend the original Act from 1987.</p> <p>Major features include:</p> <p>Provides plant breeders with the exclusive right to sell seed or reproductive material of their new varieties</p> <p>Broaden the ability for plant variety owners to earn a revenue from their investment</p> <p>A plant variety may only be owned if there is a degree of human input into the development of the variety.</p>

Recent Initiatives	Date	Description
Report on Xenotransplantation	December 2005	<p>This report was released by the Bioethics Council to guide policy decisions by the Government. A final decision on whether xenotransplantation will be allowed in New Zealand will be determined by the Government. The major recommendations of the report were:</p> <p>That xenotransplantation should be allowed to develop in New Zealand with appropriate concern given to all cultural, ethical and spiritual dimensions</p> <p>A register be established that monitors all people who receive a xeno-graft</p> <p>Highlighted the potential issue of xeno-tourism, i.e. people visiting New Zealand specifically seeking a xeno-transplant. The report suggested particularly close monitoring of such activity</p> <p>Industry participants such as Living Cell Technologies have welcomed the report by stating the “regulatory pathway for xenotransplantation is now clearer after many years of testing”.</p>
Clinical trial of xenotransplantation approved	October 2008	<p>The Minister of Health conditionally approved a clinical trial for 8 sufferers of type I diabetes to be conducted by Living Cell Technologies, using encapsulated porcine cells.</p>
New or Significantly Improved Products and Services in the last two years	June 2008	<p>This report, based on discussions with a broad range of the community, was released by the Bioethics Council to guide policy development into preimplantation genetic diagnosis (PGD). Recommendations from the report include:</p> <p>Parents have access to unbiased non-directive counselling and advice before they make a decision</p> <p>High quality and appropriate information on pre-birth testing is available to parents and the wider community</p> <p>Steps are taken to recruit and retain more genetic counsellors and geneticists to ensure a national service can be provided</p> <p>Work is done to identify and eliminate barriers to antenatal care, particularly for Māori women</p> <p>There are insufficient cultural, ethical and spiritual reasons to prohibit the use of PGD for sex selection for social reasons such as ‘family balancing’.</p>
Guidelines on Using Cells from Established Human Embryonic Stem Cell Lines for Research	Discussion document published in September 2006	<p>An initial discussion document was released in September 2006. The report aims to consider the ethical implications of research on human Embryonic Stem Cells (hESC). The current guidelines allow New Zealand researchers to use cells from established hESC lines in research with a number of restrictions, including mandatory ethical review of hESC research applications.</p>
Hazardous Substances and New Organisms (Genetically Modified Organisms— Information Requirements for Segregation and Tracing) Regulations 2008	2008	<p>For conditional release approvals this Regulation requires the application to include information about:</p> <p>(a) specific measures, if any, the applicant intends to take to</p> <ul style="list-style-type: none"> (i) keep the genetically modified organism separate from other organisms, whether the other organisms are genetically modified or not; and (ii) enable the genetically modified organism to be traced after it is released with controls; and <p>(b) the level of effectiveness the applicant expects the measures to achieve.</p>

Regulatory Issues: Living Cell Technologies (LCT)

Living Cell Technologies has developed technology that involves porcine cells encapsulated in a porous seaweed extract. This allows the cells to communicate with the body with important signals, such as Insulin for diabetics, without the body attacking and rejecting the foreign cells. Despite the potential for the technology to address significant medical needs in areas such as diabetes and neurological diseases, the procedure of injecting pig derived cells into humans is not always openly accepted.

In 1996, research performed by Professor Elliott in transplanting insulin secreting porcine cells into six diabetic patients was halted amid safety concerns. The concerns focused on the potential for infection of the patients by PERV (porcine endogenous retrovirus). To circumvent the issue of xenotic infection, LCT is using a breed of pigs from the isolated Auckland Islands which is free of infections that are common in other herds.

In 2005, the Bioethics Council conducted a survey to understand the role of xenotransplantation in society which, while highlighting some issues to consider, generally found favourably on its development (see Table above). The regulation around the nature and design of clinical trials for this technology also presents unusual concerns. LCT is once again taking this technology to clinical trial and in August 2006 filed a MedSafe application to conduct a Phase I/IIa clinical trial of the DiabeCell® product.

The Minister of Health, the Honourable David Cunliffe, granted approval for LCT to conduct porcine clinical trials on 8 New Zealand diabetes sufferers in October 2008. Reflecting their success, LCT are expanding with the construction of a new Designed Pathogen Free Facility underway in Invercargill. This Facility is due to be operational at the beginning of 2009, and will house LCT's unique pig herd.

The creation of an Australia New Zealand Therapeutic Products Authority (ANZTPA) failed to gain sufficient support in New Zealand's Parliament in 2007. It is uncertain whether this initiative will proceed in the current Parliamentary term. The goal is to create a unified trans-Tasman agency to regulate therapeutic products (including medicines, medical devices and complementary medicines/dietary supplements that have therapeutic use) in both countries. This has the potential to have significant impacts on the way these products are regulated in New Zealand and to address industry concerns around cost, time delays, bureaucracy and level of mutual recognition. These changes are likely to be felt particularly in medical devices, complementary medicines and dietary supplements. A period of public consultation was carried out in mid 2006, which was concluded in August 2006.

9.3 Taxation and Other Public Policy and Regulatory Developments

The creation of a single industry body, NZBIO, has been a key development for New Zealand's biotechnology sector. As the biotechnology sector's national industry body, NZBIO works on behalf of the biotechnology community as a whole, including NZBIO members, the Government, and local and global partners. The Ministry of Economic Development (MED), through NZTE, provided seed funding in 2003 to establish NZBIO from the merger of the New Zealand Biotechnology Association with BIOTENZ. NZBIO now has over 100 corporate and 200 individual members.

The goals of NZBIO are to (1) encourage the generation of valuable intellectual property, (2) create a favourable operating environment for commercialisation, (3) develop business connections, and (4) promote industry development and raise the industry's profile. NZBIO has been active on issues such as the investment, taxation and regulatory environment and has acted as a "champion" to address these and other industry actions identified in the Biotechnology Taskforce Report.

Tax Legislation

There are a number of changes in **tax legislation** being examined that could have a significant impact on the biotechnology sector, both in terms of R&D and investment:

- Carry forward of tax losses: Under previous law, introducing major new investors would usually result in deductions for previous R&D expenditure being forfeited (as a level of shareholder continuity was required). Recent changes in tax legislation overcome the need for continuity and companies will instead be able to elect to offset R&D expenditure against income derived from the underlying technology. On a practical level, companies can now capitalise their loss until such time as the company starts to derive income from the company's R&D products. In this way the tax burden on companies that have several major rounds of investment is equivalent to companies expensing R&D against current year income. These changes were put in effect starting in the 2005-06 income year
- Tax on Staff Options: Existing valuation and timing methods of tax significantly reduce the effectiveness of staff options as employee incentives. The Inland Revenue Department has committed to addressing this issue and revision of this area is expected to occur over the next two years
- Limited partnership model: The Government has announced an overhaul of its legal partnership legislation and intends to adopt many of the features from Limited Partnerships found in other jurisdictions. The revised law is intended to apply from 1 April 2008
- Other current discussions and proposals around tax legislation include changes to the corporate tax rate and measures to reduce the cost of complying with tax rules. These are generally viewed to have a positive potential impact on the biotechnology sector.

Other regulatory and policy developments

Other regulatory and policy undertakings are included in the following table:

Development	Description
Australia New Zealand Biotechnology Alliance:	New Zealand's inclusion in the Australia New Zealand Biotechnology Alliance: This partnership between Australia and New Zealand was formed to promote leading R&D and business opportunities by building critical mass in the region through collaborative efforts to promote and globally market competitive advantages. The members of ANZBA are the Australian State and Territory Governments and the Government of New Zealand. These members work closely with industry and the research community. (www.biotechalliance.org)
Australia New Zealand Biotechnology Partnership Fund (ANZBPF):	This fund became operational in 2004 and is designed to facilitate and accelerate trans-Tasman biotechnology industry collaboration in order to create greater regional critical mass. It is administered by NZTE (www.nzte.govt.nz)
Biotechnology Research Roadmap	MoRST has published a Biotechnology Research Roadmap, along with roadmaps in the areas of nanoscience and nanotechnologies, energy and environment. Roadmaps are documents that provide an overview of an area of science activity important to Government and to New Zealand and statements about the desired directions for the science into the future. The Roadmaps are available online at www.morst.govt.nz
NZTE Beachheads Programme	The NZTE Beachheads Programme is designed for companies that need a direct presence in the market to do business. The programme links New Zealand companies into global connections and supports them to establish and expand offshore operations. The NZTE Beachheads Programme was expanded in 2005 through the addition of an office in Dubai, and a Tokyo business beachhead was established in 2006. In the 2007/2008 period the beachhead program has been expanded to include India, South America and China. (www.nzte.govt.nz)
Biotechnology Regulatory Wayfinder website	The Wayfinder website was launched by MoRST in November 2005 and is consistent with the Government's goals for greater transparency in New Zealand's biotechnology regulation. This site acts as a resource for both the scientific and the broader community to promote an understanding of the regulatory framework surrounding the biotechnology industry. (www.morst.govt.nz/wayfinder)
New Zealand New Thinking	New Zealand New Thinking which promotes New Zealand's biotechnology industry globally was launched by NZTE in 2005 and successfully used at a number of international promotions. The premise behind the program is to fulfil international marketing objectives for trade and economic development, particularly the need to widen the perception of New Zealand as a creative, innovative and technologically advanced nation. The brand has been used extensively at all NZTE-supported biotechnology trade missions in Asia, Europe and North America. (http://business.newzealand.com)
Biotechnology Roadshow	Biotechnology Roadshow national tour in 2005/2006. A touring exhibition by Te Papa and sponsored by MoRST. This roadshow travelled to 41 locations around the country and provided information on different types of biotechnologies and some of the issues they raise. (www.morst.govt.nz)
Baseline study of New Zealand's biotechnology regulatory system conducted in 2004	This involved interviewing a range of stakeholders on their perspectives of regulatory processes and what can be done to improve them. This study is available on MoRST's website. (www.morst.govt.nz)
Biotechnology Learning Hub	The Biotechnology Learning Hub provides quality teaching resources in biotechnology to New Zealand schools. The aims include promoting biotechnology education in schools, and providing a dynamic interface between teachers and the biotechnology sector. (www.biotechlearn.org.nz)
Globally Competitive Firms (GCF) programme	NZTE is leading cross-agency work to increase the scale and number of New Zealand firms successfully competing in global markets. Under the Globally Competitive Firms (GCF) framework, NZTE is focusing on providing more effective support for firms that are developing their international operations.

9.4 Summary

Summary of Public Policy Developments in the New Zealand Biotechnology Sector

Area	Summary of impact on the biotechnology sector	Comments
Government priorities and funding	Positive; the government has taken steps to encourage growth and innovation	<p>The Government has played a significant role in encouraging growth and innovation in the biotechnology sector, in particular through the development of the Biotechnology Taskforce</p> <p>Government funding into biotechnology has increased significantly to around \$250m available through a variety of agencies and departments</p> <p>An organised and joint effort continues to be undertaken by a number of government departments such as NZTE, MoRST, FRST and Investment NZ to implement key recommendations.</p>
Regulatory environment	Generally more open regulatory environment with greater clarity on key issues	<p>Over the past several years, there have been several significant decisions and changes to the regulatory environment in areas such as genetic modification and xenotransplantation which have generally provided greater clarity on New Zealand's regulatory position</p> <p>New legislation on patents is also being considered to reflect social and technological changes</p> <p>In 2007 Parliamentary support was not sufficient to support the creation of the Australia New Zealand Therapeutic Products Authority (ANZTPA).</p>
Taxation and other public policy issues	Significant developments in support of continued sector growth	<p>Many initiatives have been put in place that play a key role in addressing barriers and laying the foundation for continued growth in the sector</p> <p>In aggregate, ongoing changes in tax legislation will continue to have a significant impact on the sector</p> <p>Other developments include the formation of NZBIO, inclusion in the Australia New Zealand Biotechnology Alliance and various support and promotional programs.</p>

Section 10:

CLOSING REMARKS

This second report in the series measuring the performance of the New Zealand biotechnology industry shows that the sector has continued to grow rapidly and has had many notable successes.

- The sector continues to grow at a robust pace. The number of organisations engaged in biotechnology activity increased by one third from 2005 to 2007 to 168, covering a diverse range of activities supporting the bioeconomy, with a dominant focus on agbiosciences
- Growth in the number of employees within the “core” category of biotechnology companies was also very strong, rising by 78% between 2005 and 2007, and the net profit of the core biotechnology sector more than doubled over this period
- The biotechnology industry is continuing to make significant contributions to the national economy. Export revenues grew by over 35% p.a. The biotechnology industry has also made wider economic contributions: a recent report showed that for every 1 full-time equivalent job in the biotech industry, a further 2.41 jobs are created
- The biotechnology industry continues to keep New Zealand at the forefront of the changing bioeconomy. Many companies are focused on the evolving applications for biotechnology for clean/green technologies (e.g., Lanzatech and their proprietary ethanol production processes from industrial waste flue gases), climate change (e.g. PGG Wrightsons and their advanced grass cultivar development programs for future-proofing grasses against warmer global temperatures), and agricultural productivity to meet rapidly growing global demands for food (e.g. LIC and their programs to obtain cattle genotypes with better feed conversion efficiency)
- Government investment in the sector has increased with research funding of almost \$250m across various areas of the biotechnology industry (up from \$200m in 2005)
- Venture capital and private equity investment has soared since 2005. VC and PE investment in biotechnology in 2007 encompassed 23 deals representing an investment of almost \$67m, more than triple the investment of 2005, with a key focus on human health and food biosciences areas of biotechnology

- Publicly listed biotechnology companies have also matured over the past two years. There were no new listings during this period, but listed companies continued to raise public funds through secondary offerings; over \$100m was raised for the sector from large secondary offerings
- New Zealand biotechnology patent volume grew at 9% p.a. from 2005 with 230 patents granted in the last two years. Within OECD countries, New Zealand has dropped from 7th to 12th measured by patents per capita, however New Zealand remains significantly above the median nation with a notable specialisation in patenting biotechnology relative to innovation in other fields
- The biotechnology sector is growing in productivity as increasing numbers of companies create, improve and introduce new products. Approximately 75 biotechnology organisations released new or significantly improved products or services over 2006-2007
- New Zealand's research institutions continue to play a critical role in the continued growth and development of New Zealand's biotechnology sector. Significant levels of high quality biotechnology research continue to be conducted by New Zealand's Crown Research Institutes and across the higher education sector
- The New Zealand Government continues to be a strong supporter of the biotechnology sector, providing increased funds as noted above, and a supportive tax and regulatory environment
- Tax legislation is becoming more favourable to biotechnology companies and investors in biotechnology companies, largely due to changes in allowances for carry forward losses and proposed changes for taxation of foreign based investment
- Overall, New Zealand remains a great location to invest in and support biotechnology activities. The sector continues to have a very strong growth trajectory and a vibrant community characterised by an ease of "doing business" and a high degree of public/private cooperation. Participants and observers confidently predict continued sector growth and success.

Section 11:

APPENDIX:

NEW ZEALAND BIOTECHNOLOGY BY APPLICATION

11.1 Introduction

This section of the report separates biotechnology activity into five main fields of application:

- Agbiosciences
- Human health
- Medical devices
- Food biosciences
- Industrial biotechnology

The approach taken for this report has been to compile a list of all the major private sector biotechnology organisations and allocate them based on their “major” application area, with “major” application area estimated by L.E.K. Consulting in conjunction with MoRST and NZBIO. Statistics New Zealand has tabulated the survey responses to total income and expenditure based on the major application area and provided the results at an aggregate level. These categories have been updated and expanded from those used in the previous report (refer end of section for classifications).

Public Sector and Higher Education organisations generally participate in multiple application areas, and as a result have not been included in this analysis. However, where examples of key products and technologies developed by public sector and higher education organisations are available these have been used.

It is intended that future surveys will continue to be amended to allow collection of more accurate information regarding income and expenditure by application area.

11.2 AgBiosciences

The agricultural biotechnology sector encompasses companies developing technologies for a range of agricultural applications including livestock and crop and pasture and forestry activities. Many of New Zealand’s most significant companies are based around agricultural businesses, including dairy (Fonterra), pastoral industries (PGG Wrightsons) and forestry (Rubicon).

Given the economic importance of the agricultural sector, several of New Zealand's Crown Research Institutes and other research institutes are focused on these industries. These institutes in turn have spun off a number of private sector companies in the sector and continue to contribute to the sector's success.

Core Sector Key Metrics	2007*
Income	23%
Expenditure	24%
Headcount	27%
Number of Organisations	30

Note: *Values are approximated as they are weighted by the number of mentions

Source: Statistics New Zealand, L.E.K. analysis

Key participants

Private Sector	Public Sector
<ul style="list-style-type: none"> • Fonterra • PGG Wrightson • Livestock Improvement Corporation • Dexcel • Vialactia Biosciences (Fonterra) • Catapult • ParaCo • Orico • PharmaZen • Immune Solutions • Botry-Zen • A2 Corporation • Grasslanz • Agriseeds • Schering Plough Animal Health • South Pacific Sera • Zenith Technologies 	<ul style="list-style-type: none"> • Plant & Food Research • AgResearch • Scion (Forest Research Institute) • NIWA • Landcare Research • Massey University • Lincoln University • University of Auckland • University of Canterbury • National Centre for Advanced Bioprotection Technologies • Cawthron Institute

Major achievements / milestones during 2006 to 2008

Organisation	Achievement
LIC	<p>September 2006: LIC launched a PCR based diagnostic test for Bovine Viral Diarrhoea (BVD). Initial uptake of the test exceeded expectations and subsequent growth in demand has consistently topped 25% per annum</p> <p>August 2007: LIC launched the test day model to the herd testing business to give farmers the option of reducing the labour and time required for herd testing. Technological and computing advances mean LIC is able to offer farmers similar information to herd testing for half the effort</p> <p>October 2008: LIC launched DNA screening and advanced genetic algorithms to estimate the genetic worth of sires. The technology delivers unparalleled levels of genetic gain to the dairy industry.</p>
AgResearch	Genomnz™ Facial Eczema (FE) DNA marker testing service launched Nov 2008.
Argenta	The world's first Contract Development and Manufacturing Organisation (CDMO) dedicated to animal health, Argenta was formed in 2006 through the acquisition of Nufarm Health & Sciences, which manufactured animal health pharmaceuticals for the Australasian market, and Chemlabs, an animal health R&D company.

11.3 Human Health Biotechnology

The New Zealand biotechnology sector has spawned a number of important pharmaceutical and nutraceutical companies. While pharmaceutical research and manufacturing is not a large industry for New Zealand, pockets of excellence have given rise to a number of world-leading products and innovation. New Zealand's breadth of capability in the functional food and nutraceutical area of human health is in part derived from the strengths and importance of food and agriculture to the economy.

Core Sector Key Metrics	2007*
Income	21%
Expenditure	22%
Headcount	22%
Number of Organisations	20

Note: *Values are approximated as they are weighted by the number of mentions

Source: Statistics New Zealand, L.E.K. analysis

Key participants

Private Sector

- Antipodean Biotechnology
- BLIS Technologies
- CoDa Therapeutics
- Genesis Research and Development
- Living Cell Technologies
- Neuren Pharmaceuticals
- Proacta
- Protomix Corporation
- Virionyx Corporation
- Keratec
- LactoPharma (JV with Fonterra)
- Healtheries of NZ
- Just the Berries
- BioVittoria

Public Sector

- Liggins Institute
- Malaghan Institute of Medical Research
- Allan Wilson Centre for Molecular Ecology and Evolution (Massey University)
- Auckland Cancer Society
- Auckland Uniservices Ltd
- Industrial Research Limited
- University of Auckland
- University of Otago
- Victoria University
- Centre for Molecular Biodiscovery and National Centre for Growth and Discovery (University of Auckland)
- National Centre for Growth and Development
- Bioactivity Innovation Group (Wellington School of Medicine and Health Services)

Major achievements / milestones during 2006 to 2008

Organisation	Achievement
Malaghan Institute of Medical Research	Collaboration with Victoria Link, Industrial Research Ltd and Grow Wellington to develop a vaccine against cancer The cancer vaccine platform was expanded in 2008 to include clinical trials against brain tumours (glioblastoma multiform).
IRL	Collaboration between IRL and Victoria University is undertaking work to passively monitor the heartbeat of unborn babies. The research aims to create technology that separates foetal heartbeats from interfering sounds such as the mother's heartbeat, helping to reduce the need for repeated use of ultrasound on unborn babies.
LCT	During 2008 Living Cell Technologies listed its American Depositary Receipts on an over the counter US exchange. The OTCQX is used to obtain greater exposure and raise capital in the world market. This is a positive move from LCT to build presence in the USA and to improve liquidity of its stock.

11.4 Medical Devices

Medical Devices have gained increasing stature in the biotechnology sector, mostly due to the high profile successes of Fisher and Paykel Healthcare. Of the approximately 60 companies who are developers and manufacturers of medical devices, only 15-20 focus on devices which are Class IIa or higher. These companies have most in common with biotechnology companies in other application areas in terms of the regulatory complexity and level of innovation and investment required for commercial success.

Core Sector Key Metrics	2007*
Income	10%
Expenditure	10%
Headcount	12%
Number of Organisations	11

Note: *Values are approximated as they are weighted by the number of mentions
Source: Statistics New Zealand, L.E.K. analysis

Key participants

Private Sector	Public Sector
<ul style="list-style-type: none"> • Fisher & Paykel Healthcare • BrainZ Instruments • Sunshine Heart • Pacific Edge Biotechnology • Adept Medical • Enztec • KODE Biotech • Arotec Diagnostics • Auximedica • Molemap 	<ul style="list-style-type: none"> • Liggins Institute • University of Auckland / Uniservices • Auckland University of Technology • Industrial Research Limited

Major achievements / milestones during 2006 to 2008

Organisation	Achievement
Fisher & Paykel Healthcare	<p>Fisher & Paykel Healthcare has outperformed the other biotech companies, with total shareholder return staying broadly in line with the NZX over the last five years.</p> <p>Introduced new CPAP flow generators and masks, for the treatment of obstructive sleep apnea, in October 2008.</p> <p>Received a Government investment of \$928,000 from Technology NZ to support a multi centre clinical trial of the company's humidification therapies to treat the side effects of cancer treatment.</p>
PEBL	<p>Announced an international partnership with the Ludwig Institute for the development of a prognostic tool for the segregation of patients with invasive melanoma.</p> <p>Clinical trials are underway in Japan for PEBL's bladder cancer diagnostic.</p>
BrainZ Instruments	<p>RecogniZe™ bedside monitoring technology launched in Europe at an international conference in Jan 2008.</p>

11.5 Food Biosciences

Gaining recognition in the biotechnology industry, and driven by the increasing interest and investment in nutraceuticals, the food & beverage sector is having a noted impact on biotechnology developments, and is introduced in this section for the first time. The human health and food biosciences areas of biotechnology have become the largest attractors of venture capital funding over the last two years with over 30 deals completed in these areas alone.

Core Sector Key Metrics	2007*
Income	22%
Expenditure	19%
Headcount	17%
Number of Organisations	17

Note: *Values are approximated as they are weighted by the number of mentions

Source: Statistics New Zealand, L.E.K. analysis

Key participants

Private Sector	Public Sector
<ul style="list-style-type: none"> • Fonterra • Healtheries • Biodiscovery • Tatua • Waitaki Biosciences • A2 Corporation • Seperex Nutritional 	<ul style="list-style-type: none"> • Plant & Food Research • Massey University • University of Auckland • University of Otago

Major achievements / milestones during 2006 to 2008

Organisation	Achievement
Plant & Food Research	A merger between CRIs HortResearch and Crop & Food Research was announced in early 2008 and the new entity, Plant & Food Research, established.
Vital Foods	Clinical trials and launch of Phloe™, a kiwifruit-derived digestive health aid (nutraceutical).
Manuka Health	Launched MGO™ Manuka Honey, a dietary aid for digestive health.

11.6 Industrial Biotechnology

Industrial biotechnology has been driven globally by a “clean and green” differentiation, with a strong research drive for sustainability across all industrial areas, but led by bioenergy investigations.

Core Sector Key Metrics	2007*
Income	24%
Expenditure	25%
Headcount	23%
Number of Organisations	23

Note: *Values are approximated as they are weighted by the number of mentions

Source: Statistics New Zealand, L.E.K. analysis

Key participants

Private Sector	Public Sector
<ul style="list-style-type: none"> • Biopolymer network • Glycosyn • NZ Pharmaceuticals • Polybatics • ZyGEM • Genesis R&D • Lanzatech 	<ul style="list-style-type: none"> • Environmental Science and Research • Industrial Research Limited • Geological and Nuclear Sciences • Landcare Research • University of Waikato • Victoria University

Major achievements / milestones during 2006 to 2008

Organisation	Achievement
NZ Pharmaceuticals	New Zealand Pharmaceuticals Ltd (NZP) received the 2007 Agritech, Life Sciences and Biotechnology Exporter of the Year Award, in recognition of the company's continued growth in difficult global trading conditions and improvement and investment in their overall capability and capacity. Opening a \$10 million specialty manufacturing facility has given NZP a platform to accelerate its export growth rapidly, providing the firm with much greater operational capability and advanced compliance levels.
Lanzatech	Attracted US investment of \$4.7m for their proprietary ethanol production processes from industrial waste flue gases.
Aquaflow Bionomics	Green-crude produced from their proprietary processes for the conversion of algae to next generation Biofuel.

11.7 Application Area Definitions

Agbiosciences	Human Health
<ul style="list-style-type: none"> • Animal genomics/IP • Animal improvement/reproductive technologies • Animal health/nutrition • Animal products (non-food) • Plant genomics/IP • Plant improvement • Plant health/protection • Plant growth • Aquaculture 	<ul style="list-style-type: none"> • Biopharming (use of GM animals to produce pharmaceuticals) • Biopharming (use of GM plants to produce pharmaceuticals) • Oncology/cancer • Diabetes/CVD • Neurological/muscular diseases • Immunological diseases/parasitology • Infectious diseases • Osteoporosis/bone health • Reproduction • Brain/neural studies • Small organic compounds
<p data-bbox="113 768 280 790">Food Biosciences</p> <ul style="list-style-type: none"> • Food materials/ingredients • Food production technologies • Functional foods/nutraceuticals • Diagnostics/biosensors/tests • Food processing/preservation technologies • Marine-sourced bioactives 	<p data-bbox="608 857 703 880">Industrial</p> <ul style="list-style-type: none"> • Biomanufacturing • New materials • Process monitoring • Extremophiles/enzymes • Bioremediation • Mitigation technologies • Biosecurity/pest control technologies • Environmental indicators • Biodiversity/ecology/evolution
<p data-bbox="113 1077 424 1099">Medical Devices and Diagnostics</p> <ul style="list-style-type: none"> • Medical diagnostics/devices • Biomedical imaging/bioengineering 	

Section 12:

APPENDIX: PROFILE OF NEW ZEALAND AS AN INVESTMENT LOCATION

Highlights

- New Zealand has distinct advantages as a biotechnology investment location for a wide range of investors such as multinationals, venture capitalists and international research institutions
 - In addition to having world-class capabilities in key niche areas such as forestry, agriculture, animal research, nutritional products and human health research, New Zealand has a supportive business environment
 - Stable, cost competitive business environment
 - Active support from the New Zealand Government
 - New Zealand is characterised by:
 - Strong national financial indicators
 - A simple tax system with a corporate tax rate of just 30% and minimal, and in most instances zero, capital gains tax
 - A flexible, deregulated labour market
 - A highly educated and multi-skilled workforce
 - Modernised infrastructure through corporatisation and privatisation of state assets
 - Freely floating exchange rate
 - Unencumbered free movement of capital
-

This section focuses on describing key aspects of New Zealand's business environment.

12.1 Key Economic Indicators

New Zealand's economy is diversified, innovative and highly export-oriented. New Zealand has completed more than a decade of economic restructuring, and now has a stable economy well geared for long term international competitiveness. This provides a transparent and stable platform for future business investment.

New Zealand is a small country, with approximately 4.3 million people growing at 1% p.a. New Zealand's GDP is approximately NZ\$179b in nominal terms, which equates to a nominal GDP per capita of NZ\$42,089. CPI inflation was 3.4% while unemployment was 4.2%, more than one percentage point below the OECD average. Over the past several years, New Zealand has become a net importer, driven by the strength of the domestic sector.

In terms of exports, New Zealand's largest exports are milk and milk products (e.g., butter, cheese), meat, and wood / forestry products. New Zealand's strength in agriculture is reflected in these exports: agriculture accounted for over 40% of total exports in 2007, which is six times the average for 20 other major countries.⁸ Australia, USA, Japan, China and the UK remain as its largest export partners. New Zealand's largest imports include petroleum and products, mechanical machinery / equipment and vehicles, including parts and accessories.

Key Economic Indicators for New Zealand

Indicator	Year End March 2008
Population	4,241,000
Real GDP (\$)	NZ\$130.4 b
Real GDP per capita	\$30,757
CPI Inflation	3.4%
Unemployment Rate	3.7%
Exports*	NZ\$41,718 b
Imports*	NZ\$46,000 b
Trade Balance*	NZ(\$4,282 b)

Note: * Year end August 2008

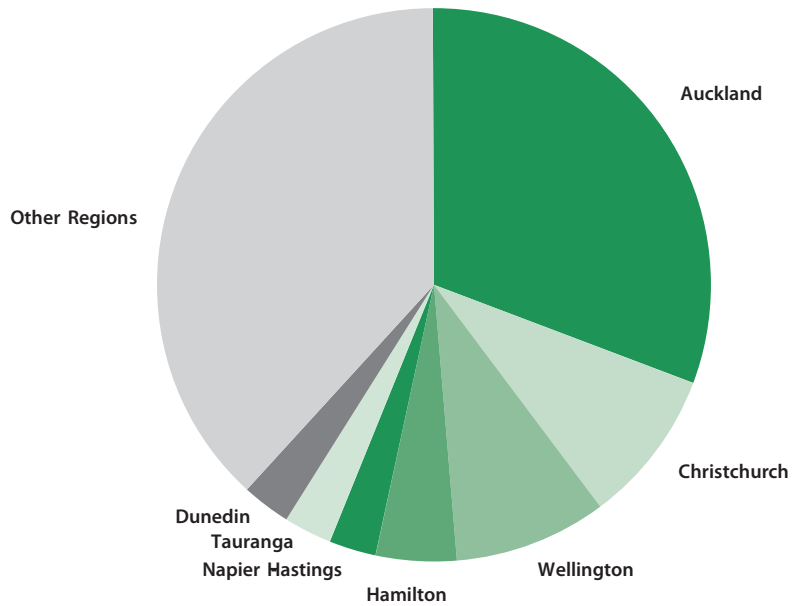
Source: Statistics New Zealand, Reserve Bank of New Zealand

Auckland is New Zealand's largest city with approximately 30% of the population and is located on the North Island. Wellington and Christchurch are New Zealand's next largest cities, each accounting for approximately 10% of the population. Wellington is New Zealand's capital city and is located on the North Island, while Christchurch is located on the South Island.

The financial sector accounts for over 25% of New Zealand's GDP, followed by manufacturing; community services; and transport and communications. Together, agriculture combined with fishing, forestry and mining account for a further 7% of GDP.

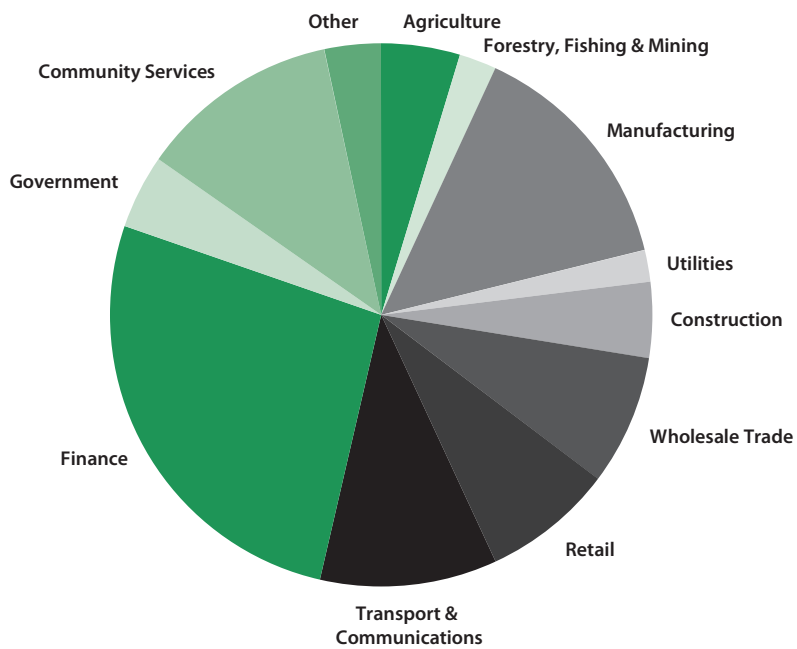
New Zealand's official cash rate (OCR) is set by the Reserve Bank and has fluctuated between 3.5% and 8.25% over the last ten years. In January 2009, The Reserve Bank reduced the OCR to 3.5 percent, its lowest point since its introduction in 1999.

New Zealand Population by City (2008)



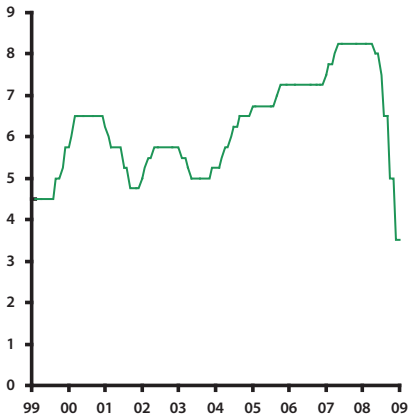
Source: Statistics New Zealand

New Zealand GDP by Industry Sector (2008)

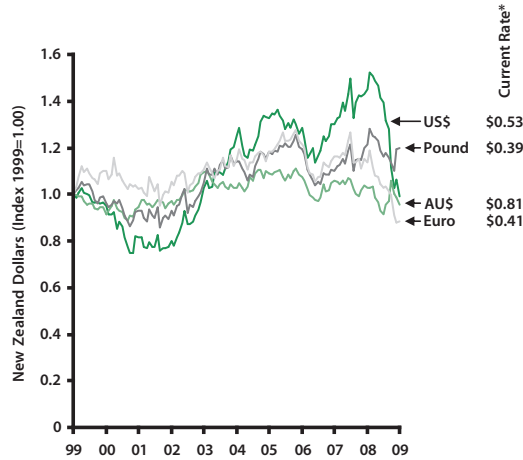


Source: Statistics New Zealand

**New Zealand Official Cash Rate (OCR)
(Mar 1999 - Feb 2009)**



**Monthly New Zealand Exchange Rates
(1999 - Jan 2009)**



Note: *As at 26/01/2009
Source: DataStream

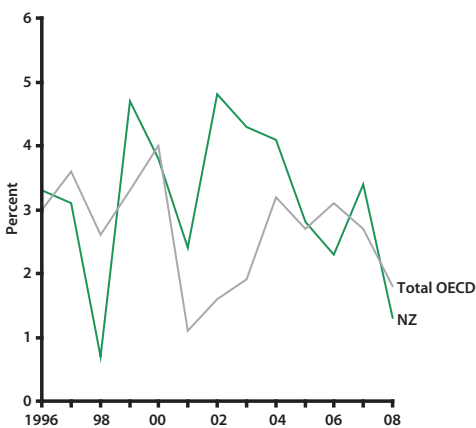
Source: DataStream

New Zealand has a freely floating exchange rate. From 2001 until the end of 2007, the New Zealand dollar strengthened against the major currencies, almost doubling against the United States dollar. During 2008 however, the New Zealand dollar has lost value relative to the US dollar, the pound and the euro.

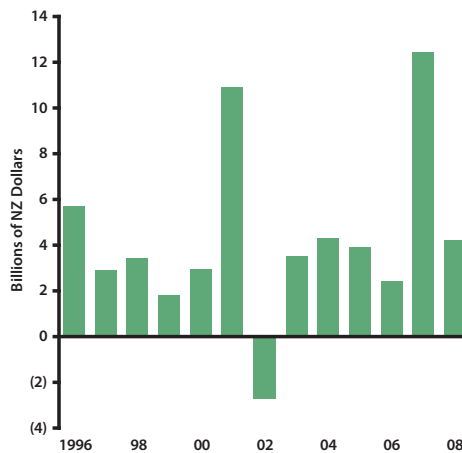
New Zealand has experienced strong economic growth over the past decade. GDP growth has averaged over 3.4% pa over the past 10 years, compared to an OECD average of less than 2.5%. However, over the past several years, real GDP growth has started to show signs of slowing.

Inward foreign direct investment (FDI) totalled NZ\$55.8b in the period from 1996 to 2008. Since 2003, FDI has averaged over NZ\$5b per year.

**Real GDP Growth
(1996 - 2008)**



**Inward Foreign Direct Investment*
(1996 - 2008)**



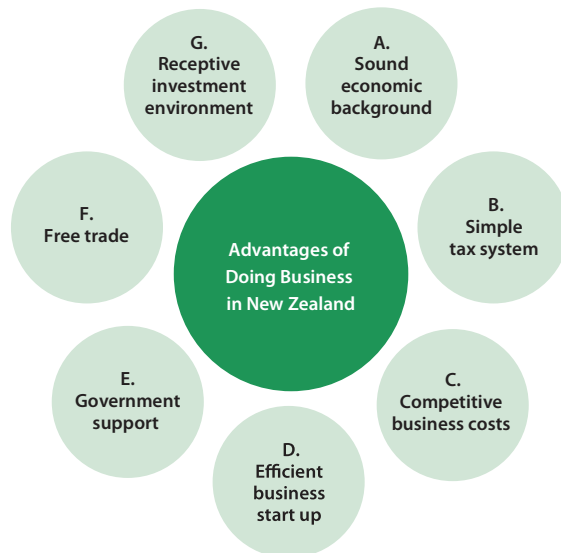
Note: *Based on balance of payments information, excluding reserve assets
Source: Statistics New Zealand, NZ Treasury

Source: OECD

12.2 Advantages of Doing Business in New Zealand

New Zealand welcomes Foreign Direct Investment from the international community recognising the important role it has to play in fuelling the development of a knowledge-based economy.

New Zealand has significant advantages for foreign investors:



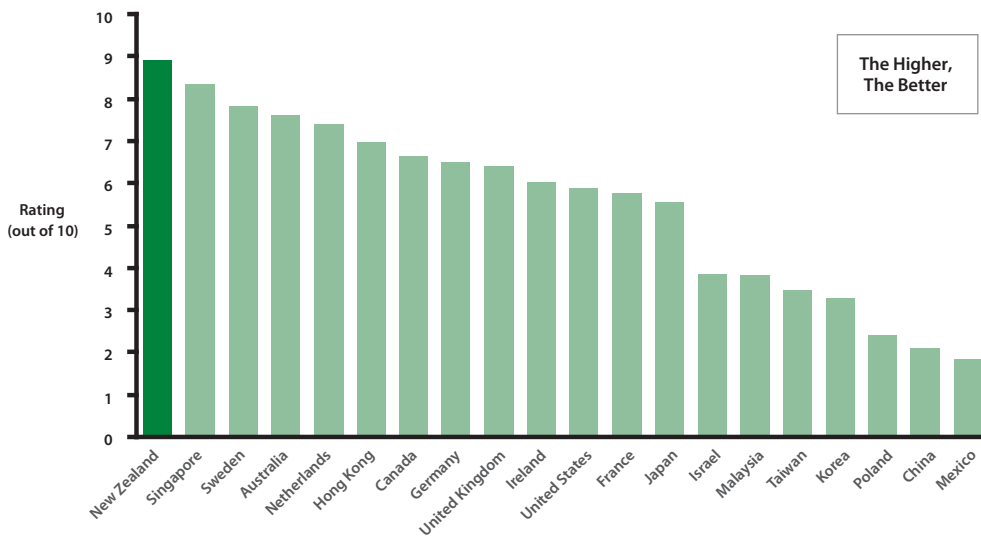
Sound Economic Background

New Zealand's macro-economic environment provides investors with a transparent and stable platform for long-term business. The country has already completed more than a decade of radical economic restructuring, and now has an economy well geared for long term international competitiveness:

- Freely floating exchange rate
- Free movement of capital
- No subsidies
- Deregulation and tariff reduction
- A flexible labour market
- Modernised infrastructure through corporatisation and privatisation of state assets
- Strong national financial indicators, including operating balance surpluses, well-contained inflation, and an attractive exchange rate.

The Economic Freedom of the World 2008 Report published by the Fraser Institute ranks New Zealand as the world's third most economically free country. It is also ranked as the world's first least corrupt country.

Corruption Perceptions Index (2008)



Source: IMD World Competitiveness Yearbook 2008

Simple tax system

Some of the important features of the New Zealand tax system and policy environment are:

- No capital gains tax
- No employee payroll tax
- No social security tax

All companies, whether resident or non-resident, are taxed at the same rate of 30 percent.

Distributions from the subsidiary to its parent company are also subject to non-resident withholding tax (NRWT). The Inland Revenue Department (IRD) collects and administers taxes and duties for the government (www.ird.govt.nz). New Zealand's indirect (or 'consumption') tax is a goods and services tax at 12.5 percent, payable by the final consumer of goods and services.

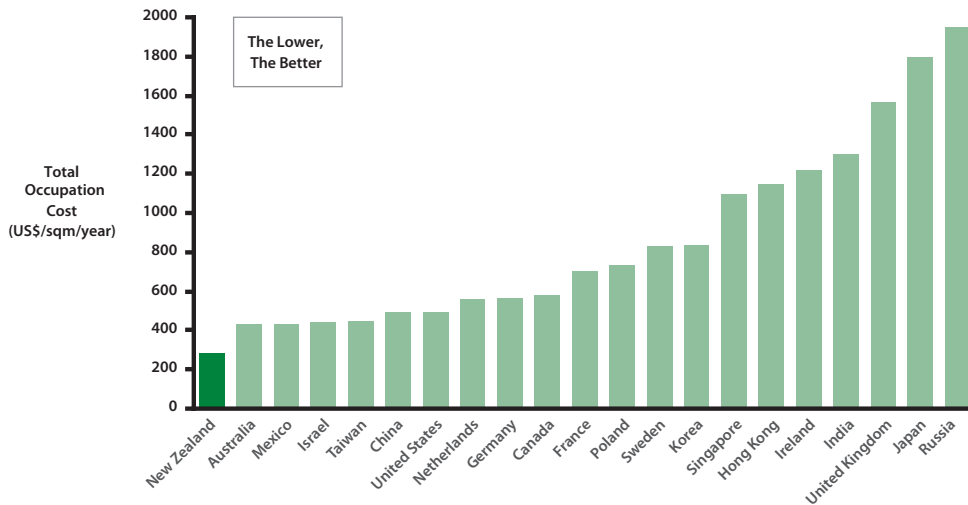
Competitive business costs

Business costs in New Zealand, particularly staff costs, are competitive relative to other OECD countries. Rents, property and utilities are very competitive on a global basis with property costs in particular being amongst the most competitive in the Pacific Rim.

New Zealand's deregulated labour market is based on voluntary union membership, individual employment agreements and proactive recruitment of skilled overseas workers. New Zealand's immigration policy attracts skilled employees and entrepreneurs to New Zealand, and the New Zealand Immigration Service provides facilitation services for businesses sourcing or relocating international staff.

New Zealand's office rental rates and industrial construction costs are amongst the lowest in the world. The New Zealand Government's foreign ownership regime maintains a liberal foreign investment environment, and aims to reduce compliance costs as much as possible.

Office Rent (2007)



Source: IMD World Competitiveness Yearbook 2008

Efficient Business Start Up

New Zealand's business start-up process is the fastest, simplest and easiest in the OECD. Starting up a business in New Zealand can take as little as three days. Only investment proposals that involve internationally based investment equity of 25% or more in an existing New Zealand company, or have a value of over NZD100 million (USD75 million), or are related to fishing quotas or particularly sensitive land purchases require approval. The Overseas Investment Office governs investments exceeding these limits using clearly described and straightforward processes.

Top Ten Ranked Economies for Ease of Doing Business (2009)

Economy	Ease of Doing Business	Starting a Business	Dealing with Construction Permits	Employing Workers	Registering Property	Getting Credit	Protecting Investors	Paying Taxes	Enforcing Contracts
Singapore	1	10	2	1	16	5	2	5	14
New Zealand	2	1	2	14	3	5	1	12	11
United States	3	6	26	1	12	5	5	46	6
Hong Kong	4	15	20	20	74	2	3	3	1
Denmark	5	16	7	10	43	12	24	13	29
United Kingdom	6	8	61	28	22	2	9	16	24
Ireland	7	5	30	38	82	12	5	6	39
Canada	8	2	29	18	32	28	5	28	58
Australia	9	3	57	8	33	5	53	48	20
Norway	10	33	66	99	8	43	18	18	7

Source: "Doing Business 2009 - Comparing regulation in 181 economies", World Bank and International Finance Corp

Government support

The New Zealand Government plays an important role in supporting and facilitating foreign investment into New Zealand, primarily through two support entities (in addition to incentives and policies as described elsewhere in this section).

Investment New Zealand	The Overseas Investment Office (OIO)
<ul style="list-style-type: none"> • Through a network of investment managers in New Zealand and in strategic locations around the world, Investment New Zealand actively assists international corporate investors to: <ul style="list-style-type: none"> • Relocate their businesses to New Zealand • Establish greenfield operations • Invest in and work with New Zealand companies in global ventures • Investment New Zealand also matches high-growth New Zealand businesses in strategic sectors to international investors. These investors provide capital, technical and management capability, overseas distribution channels, and help fill gaps in the New Zealand industry value chain. 	<ul style="list-style-type: none"> • The Overseas Investment Office (OIO) administers the New Zealand Government's foreign investment policies • The OIO was established through the introduction of the Overseas Investment Act 2005 on the 25 August 2005 <ul style="list-style-type: none"> • The Act disestablished the Overseas Investment Commission in existence since 1973 • Transfers the Commission's function to a new unit situated at Land Information New Zealand, namely the Overseas Investment Office • Most recent publications and regulations can be found at http://www.oio.linz.govt.nz/index.htm

Source: "Doing Business 2009 - Comparing regulation in 181 economies", World Bank and International Finance Corp

Free trade

New Zealand's close trade and legal relationship with Australia gives businesses operating from New Zealand duty free access to a population of 24 million. New Zealand's free trade relationships, including recent economic co-operation agreements with Singapore and Thailand, and world-first negotiations with the People's Republic of China, will significantly increase the size of the New Zealand consumer market.

Receptive investment environment

As at 31 March 2008, foreign investment in New Zealand totalled \$NZ275 billion. Australia accounted for \$NZ87 billion (31.7%) of total foreign investment in New Zealand, and the US and UK accounted for \$91 billion (33.3%) combined. The Netherlands, Japan, Hong Kong, Singapore, Canada, Germany and Switzerland are also all investing here. New Zealanders are used to working with international companies and have a strong understanding of their needs and performance expectations. New Zealand has a strong collaborative track record which is supported by a receptive investment environment.

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