appendix 1

Context and process

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Introduction to Appendix 1

This volume is one of the appendix volumes to the report of the Royal Commission on Genetic Modification to the New Zealand Government on its investigations into the strategic options and desirable changes to regulatory mechanisms to enable New Zealand to address genetic modification, genetically modified organisms, and products.

There are three appendix volumes covering the New Zealand context, the Commission's consultative processes and the outcomes of that consultation:

- Appendix 1 outlines the New Zealand context for the inquiry and records the major aspects of the processes of the Commission.
- Appendix 2 summarises and analyses submissions from Interested Persons.
- Appendix 3 summarises and analyses submissions from the Public.

This volume (Appendix 1) on context and process also includes glossaries (technical terms, Maori terms and abbreviations) and an index.

Abbreviations and macrons

In referring to organisations and Interested Persons, this volume uses the title in full at first mention in each subsection of the report and thereafter uses any designated abbreviated form or acronym. This procedure is repeated for each subsection. For example, in any subsection, *Malaghan Institute of Medical Research* will subsequently be referred to as *Malaghan Institute*, and *Environmental Risk Management Authority (ERMA)* will be followed by *ERMA*. The choices for abbreviated forms of Interested Persons are listed in Appendix 2, Table 1. Other abbreviations and acronyms are recorded in the Glossaries section of this volume.

The printed version of the report of the Commission adopts the common modern usage of macrons over long vowels in Maori terms. (A glossary of Maori terms is included in this volume.)

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appendix 1

Context and process

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1.1 New Zealand: the country and its economy

New Zealand, also known by its Māori name of Aotearoa, is a social democracy with a diverse population, geographically remote from most of the world's population and major developed nations. These and other features affect the way in which New Zealanders respond to debate over genetic modification. To provide some context for the Report of the Commission and the analysis of its consultative process (Appendices 2 and 3), this section of Appendix 1 includes an outline of the country and its economy in terms of:

- geography
- population
- social history
- economic history
- current economic conditions
- major industries
- imports
- exports
- knowledge-based economy.

Geography

New Zealand comprises three large and many small islands in the South Pacific Ocean, southeast of Australia. Its land area is 268,680 km^2, about the size of Colorado or slightly larger than the United Kingdom. The country is long and narrow from north to south, and has a long coastline of 15,134 km, which makes it ninth in the world in terms of coastline length, ahead of China with 14,500 km, United Kingdom with 12,429 km and India with 7000 km. New Zealand's terrain is predominately mountainous with some large coastal plains. The climate is temperate with sharp regional contrasts. Natural resources include iron ore, sand, coal, gold, limestone timber, natural gas and hydropower, as well as the extensive marine environment. Current environmental issues include deforestation, soil erosion, climate change and the devastation of native flora and fauna by introduced species.

The official languages are English and Māori.

Population

At the beginning of 2001 the population of New Zealand was 3.849 million, about 85% as city dwellers. New Zealand has been ethnically and culturally connected to Polynesia for at least 1000 years. Less than 200 years ago, its population and cultural heritage was wholly Polynesian, but now New Zealand is dominated by cultural traditions that are mainly European, coming especially from Britain.

According to the 1996 Census, about 79% of New Zealanders are of European origin, predominantly from the British Isles. As the tāngata whenua, the indigenous population, Māori people occupy a unique place in New Zealand society. Māori make up the next largest group of the population, about 14.5% in 1996. The third main ethnic group, at 5.6% of the population, is the Pacific Islands people. In recent years, immigration from Asian countries has increased greatly.

In 1996, Māori were over-represented in the lowest two household income quartiles[1] and under-represented in the top two quartiles. In 1996, 38.5% of Māori were in the lowest income quartile. In contrast, 12.6% of all Māori were in the highest household income quartile compared with 26.9% of non-Māori.

In recent decades Māori culture has undergone a major renaissance involving culture, language, traditions and heritage. Over the past decade, education

[1] When a population is ranked in order of income, the 25 percent with the lowest income are the lowest quartile. Population data are adjusted for differing family size between the Maori and non-Maori populations.

initiatives have been developed by Māori, for Māori, in order to improve outcomes for Māori. The importance of the Māori language has stimulated the growth of Māori-medium education from pre-school to the end of secondary schooling. At the 1996 Census, approximately 25% of Māori reported that they could speak the Māori language.

Average family gross incomes for the year ended June 2000, including government benefits and other non-wage income, were: for a couple with children, $66,054[2]; for a couple without children, $59,051; for a sole parent, $25,171; and for a single person, $21,272.

Social history

Polynesian settlers are believed to have arrived in New Zealand about the 10th century, although Māori oral tradition and some research places the date some centuries earlier. By the 12th century, they had settled around the coastline. The Dutch navigator Abel Tasman was the first European visitor in 1642. In 1769, the British naval captain James Cook and his crew became the first Europeans to explore New Zealand's coastline thoroughly.

By the late 1830s, there were approximately 125,000 Māori and 2000 European settlers in New Zealand. Immigrants were arriving all the time and the British Crown sent Captain William Hobson to act in the negotiation of a treaty between the Crown and Māori.

On 6 February 1840, approximately 45 Māori rangatira (chiefs) and several English residents signed the Treaty of Waitangi at Waitangi in the Bay of Islands in the North Island of New Zealand. The Māori text of the Treaty was then taken around the rest of the country for signing, but the English text was signed only at two locations by 39 rangatira. By the end of that year, over 500 Māori had signed the Treaty. Of those 500, 13 were women.

The Treaty of Waitangi has two texts, one Māori and one English (these are included in the Report). The Māori text is not an exact translation of the English text. Despite the problems caused by the different versions, both represent an agreement in which Māori gave the Crown rights to govern and to develop British settlement, while the Crown guaranteed Māori full protection of their interests and status, and full citizenship rights.

[2] At March 2001, NZ$1 was equivalent to around US$0.41. Unless otherwise stated, all dollar amounts in this report refer to the New Zealand dollar.

The Treaty of Waitangi has been a significant document since its signing in 1840. However, it was not until the passing of the Treaty of Waitangi Act in 1975, which established the Waitangi Tribunal, that a forum was created with the sole purpose of investigating Treaty grievances held by Māori against the Crown. Before 1975, many Māori petitions and protests relating to the Treaty were ignored.

Waitangi Tribunal

The Waitangi Tribunal can examine any claim by individuals or groups of Māori that they have been prejudiced by laws and regulations or by acts, omissions, policies or practices of the Crown since 1840 that are inconsistent with the principles of the Treaty of Waitangi. The Tribunal makes findings on whether a claim is well founded, and outlines how the principles of the Treaty have been breached. It publishes its findings in an official report to the Minister of Māori Affairs, and may recommend to Government what could be done to compensate the claimant (or claimants) or to remove the harm that they have suffered. These recommendations must be practical.

The Tribunal has completed almost 70 reports on claims covering a range of issues. Many are about land loss and alienation while others range from the Māori language and the radio spectrum to the environment, geothermal resources and fisheries. Government has implemented many of the recommendations contained in those reports. The reports have also played an important role in many initiatives and new institutions, including Māori radio (reo irirangi), Māori Language Commission (Te Taura Whiri i te Reo Māori) and Māori Broadcasting Funding Agency (Te Mangai Paho).

Among claims not yet completed is the WAI 262 Indigenous Flora and Fauna Claim, which concerns, among other things, property and ownership rights over indigenous flora and fauna. These topics, and the slow progress of the claim, were raised in the discourse on genetic modification.

Economic history

In 2001, New Zealand has a mixed economy with sizable manufacturing and service sectors complementing a highly efficient export-oriented agricultural sector. This situation has evolved over the past 50 years since New Zealand's emergence from World War II with an expanding and successful agriculture-based economy. In the 1950s and 1960s, gross domestic product (GDP) grew at an average annual rate of 4% with agricultural prices remaining high. However, between 1949 and 1960, New Zealand's productivity growth was one of the lowest amongst the world's highest-earning economies.

In the 1970s, access into key world markets for agricultural commodities became increasingly difficult. The sharp rises in international oil prices in 1973 and 1974 coincided with falls in prices received for exports. As in many OECD countries, policies in New Zealand were aimed principally at maintaining a high level of economic activity and employment in the short term. High levels of protection of domestic industry had greatly undermined competitiveness and the economy's ability to adapt to the changing world environment. After the next major shift in oil and commodity prices in 1979 and 1980, New Zealand's position deteriorated further.

From around 1984 onwards, the direction of economic policy in New Zealand turned away from intervention toward the elimination of many forms of government assistance. On the macroeconomic level, policies have aimed at achieving low inflation and a sound fiscal position, while microeconomic reforms have been intended to open the economy to competitive pressures.

The reforms of the 1980s included: the floating of the exchange rate; abolition of controls on capital movements; the ending of industry assistance; the removal of price controls; deregulation across several sectors of the economy; corporatisation and privatisation of state-owned assets; and labour-market legislation aimed at facilitating more flexible patterns of wage bargaining.

The impact of this period of reform was widespread. The period 1981 to 1996 saw an increase in the inequality of income distribution in New Zealand, particularly in the 1980s. A study carried out for the Treasury in 2000 showed that income inequality has risen substantially relative to increases in inequality in other countries. This means that there have been general shifts into both higher and lower income brackets, with fewer New Zealanders in middle income brackets. Between 50% and 60% of the increase in inequality can be explained by an increase in sole-parent households, older households without children, and an increase in the proportion of workers in their prime earning years and with higher educational qualifications.

In terms of GDP per capita, New Zealand ranks 21st out of the 29 OECD countries when GDP is calculated according to current exchange rates, and 20th when calculated according to purchasing power parities. GDP is the aggregate used most frequently to represent the economic size of countries and, on a per capita basis, the economic wellbeing of their residents. *World Competitiveness Yearbook* (May 2000) ranks New Zealand 21st out of 47 countries in terms of competitiveness and 26th out of 47 in terms of overall productivity measured using purchasing power parity.

Current economic conditions

The economy is strongly trade oriented, with exports of goods and services accounting for around 32% of total output. New Zealand's economic performance has improved significantly over the 1990s. Far-reaching structural reforms commenced in the mid-1980s aimed at improving the microeconomic efficiency of the economy while simultaneously bringing greater stability to the macroeconomy. After a prolonged period of poor economic performance, the mid-1990s saw output recover strongly.

As a small trading nation, New Zealand is more a commodity price-taker than a price-maker. New Zealand's economy is therefore inevitably linked to the fortunes of the world economy. Looking to the medium term, the New Zealand Treasury considers that the reforms of the past 15 years mean that New Zealand should be on a growth track that is more sustainable than in the past.

Fiscal policy: the Fiscal Responsibility Act

Enacted in 1994, partly to address New Zealand's history of poor fiscal performance, to reduce public debt and to improve fiscal management, the Fiscal Responsibility Act represents the culmination of a major reform to fiscal management in New Zealand. Like much of the reform of the public sector that took place during the late 1980s, the Fiscal Responsibility Act is founded on two key planks: increased transparency and greater accountability.

These requirements mean that the government of the day has to be transparent about both its intentions and the short- and long-term impact of its spending and taxation decisions. Such transparency is likely to lead governments to give more weight to the longer-term consequences of their decisions and, therefore, is likely to lead to more sustainable fiscal policy. This increases predictability and stability of fiscal policy settings, which helps promote economic growth and gives people a degree of certainty about the ongoing provision of government services and payments.

Increased transparency and greater accountability are achieved by: the requirement for governments to be explicit about their fiscal objectives and to assess them against principles of responsible fiscal management; for governments to report on a wide range of economic and fiscal information; and for parliamentary select committee review of a government's fiscal plans.

Monetary policy

The Reserve Bank of New Zealand, New Zealand's central and non-commercial bank, implements monetary policy to maintain price stability, defined as annual

inflation of 0–3%. This is achieved through the Official Cash Rate (OCR), an interest rate set by the Reserve Bank to implement monetary policy. The Reserve Bank is prepared to lend overnight money to banks and borrow overnight from banks at around the level of the OCR in whatever volumes are needed to hold the interest rate at its OCR level.

If the Reserve Bank sees inflation rising, it increases short-term wholesale interest rates. The consequent increase in the interest rates charged by commercial banks discourages consumer borrowing and encourages saving, both of which reduce spending and help to curtail inflation. In addition, higher interest rates encourage foreign savers to invest in New Zealand, putting upward pressure on the New Zealand dollar. This reduces the prices of imports, and tends to make it more difficult for New Zealand producers to put up their prices.

Similarly, if the Reserve Bank expects inflation to fall to the point where deflation may occur, it reduces short-term interest rates to get the economy moving again. This then increases demand and price-setters sense that they do not need to cut prices to keep making sales.

The Reserve Bank also promotes the stability and efficiency of the financial system as a whole through its role of "prudential supervision" of the banking sector.

Taxation

As at January 2001, the average annual full-time earnings are $36,186. The personal income tax scale, including rebates for low-income earners, is

- 15c per $1 on income up to $9,500
- 21c per $1 on income between $9,500 and $38,000
- 33c per $1 on income between $38,000 and $60,000
- 39c per $1 on income over $60,000.

Besides income tax, a comprehensive consumption tax (similar to Britain's VAT) called the Goods and Services Tax (GST) is applied to virtually all goods and services at a single rate of 12.5%.

Major industries

Many major industries are land based and export oriented, including meat and dairying, wool, fruit and forestry. The extensive agricultural sector is commodity based and is dominated by many small crops. New Zealand also has extensive fisheries. Tourism has become a major industry and one that is growing and developing rapidly.

Land-based industries

Traditionally, farming in New Zealand has centred on sheep and cattle to produce sheepmeat, beef, wool, dairy produce and hides, although recently new types of livestock have included deer (for venison and velvet), goats, ostriches and llamas. Since the 1970s, horticultural produce has also become an important export earner.

New Zealand has successfully developed an international marketing strategy of being "clean and green" which brings benefits across a wide range of industries. It has enabled the targeting, maintenance and growth of market share. This "clean and green" image was a major discussion point in the representations on genetic modification.

Uniquely among the developed countries, New Zealand farmers are almost totally exposed to world market forces. They receive no subsidies from government and have to compete with subsidised production from other producing countries. However, the General Agreement on Tariffs and Trade (GATT) Uruguay Round Agriculture Agreement, which began to take effect in 1995, imposes progressive reductions on the subsidies that other countries can give to agricultural production and exports, thus increasing access opportunities for New Zealand exports into overseas markets.

On New Zealand farms, stock are grazed in paddocks, often with movable electric fencing, which allows rotation of grazing around the farm. Grass growth is seasonal, largely dependent on location and climatic fluctuations, but normally occurs for between eight and 12 months of the year. Many farmers supplement grass feed with hay and silage, particularly in winter. Phosphoric fertilisers are used extensively on the predominantly grass/clover pasture. Nitrogen fertilisers are used to a small degree.

Probably New Zealand's best-known statistic is that it has close to 13 times as many sheep as people (one or two decades ago the figure was as high as 20 times). Grasslands have been developed to the extent that the best sheep farms can carry up to 25 sheep per hectare throughout the year. The best dairy farms carry 3.5 cows per hectare throughout the year.

Trends in livestock numbers are largely determined by world market prices for farm products, including meat, wool, dairy products and, more recently, venison and goat fibre. Over the past 14 years the sheep population has declined from over 70 million at June 1982 to around 46 million at June 1998. The beef cattle population fell to 4.4 million at June 1998, whereas the total number of dairy cattle at June 1998 is estimated to have risen to 4.4 million. In 1996, there were around 1.2 million deer in New Zealand.

Meat

New Zealand accounts for about 54% of the world export trade in sheepmeat. It is a smaller player in the global market for beef, accounting for about 6.4% of all world beef exports. About 80% of the lamb, mutton and beef produced in New Zealand is exported. The domestic market absorbs over 99% of the pigmeat and poultry produced in New Zealand.

New Zealand's major meat markets include: United Kingdom, Germany, France, Saudi Arabia and United States for lamb; United Kingdom, Germany, South Korea and France for mutton; and United States, Canada, Japan, South Korea and Taiwan for beef. The largest markets for New Zealand venison exports in 1997 were Germany, United States and France. Most of the venison produced in New Zealand is exported.

Wool

New Zealand sheep are largely dual-purpose, wool/meat animals and their wool is predominantly strong. New Zealand is the world's largest producer of crossbred (strong) wool. This type of wool is used mainly in interior textiles such as carpets, upholstery, furnishings, bedding and rugs. It is also used for handknitting yarn, in knitwear and in blankets.

It is estimated that 34% of New Zealand wool is used in machine-made carpets, 12% in hand-knotted and hand-tufted carpets, 44% in apparel and 10% in other uses, primarily upholstery and bedding. Net domestic consumption of wool in New Zealand is among the highest in the world on a per capita basis.

Around 90% of the New Zealand wool clip leaves the country in a greasy, scoured, or slipe form. Seventy-five percent of exports are scoured. Of the 10% of the clip processed in New Zealand, roughly half is exported in product form, mainly as carpet yarn, carpets or knitted jerseys. During 1997–98, the largest importers of New Zealand wool were China, United Kingdom, India, Germany and Belgium.

Dairy produce

The dairy industry is geared primarily towards overseas markets, which account for between 90% and 95% of all milk produced. The major product groups manufactured by New Zealand dairy factories are: milk powders; cream products such as butter, anhydrous milkfat and ghee; cheese; and protein products such as casein and caseinates.

New Zealand is one of the top five dairy exporters in the world, which collectively supply around 90% of dairy products traded on the international market. The New Zealand dairy industry's major markets vary for different products. Britain and the European Union (EU) are New Zealand's most valuable market for butter.

The primary markets for casein and cheese are United States, Japan and EU. New Zealand is the world's largest exporter of casein and caseinate products. New Zealand's most important milk powder markets are in Central and South America and Southeast Asia.

Poultry meat

The poultry meat industry is relatively new in New Zealand and is expanding rapidly. It is now the major intensive livestock industry in the country. The industry earns around $500 million in retail sales and provides about 3000 jobs.

Poultry consumption continues to increase as a result of declining prices in real terms, changes in lifestyle and consumer perceptions. Annual consumption has increased from 14 kg per capita 10 years ago to over 25 kg in 1997. The proportion of poultry meat consumed has increased from 15% to 25% of total meat consumption. This increase has been largely at the expense of sheepmeat.

Eggs

In 1997, New Zealand's estimated 2.55 million laying hens produced close to 756 million eggs. Over 85% of eggs are sold as table eggs within the domestic market, with the remainder used in the baking and catering industries. Retail sales of eggs are worth more than $160 million.

Total egg production has remained relatively static for the past decade, with slight drops in per capita consumption (now around 200 eggs per person annually). Most eggs produced in New Zealand are from caged hens, with free-range and barn egg production accounting for 5% of the total. The past decade has seen a wider choice of egg types available, including "wholegrain" and "omega-enriched" eggs.

Bees

The rich pasture lands of New Zealand and some of its forest and bush areas are suited to apiculture and produce high-grade honey, of which clover honey (from *Trifolium repens*) is still the principal type. Some New Zealand native honeys are also popular nationally and internationally. In addition to honey production, bees are also commonly used for commercial horticultural pollination, particularly in the kiwifruit industry, besides playing a major role in unpaid pollination.

In 1992 researchers confirmed that manuka honey (from *Leptospermum scoparium*) is very effective as an antiseptic dressing. Because of this, both the demand and the price for manuka honey have risen dramatically. The industry's other products include beeswax, pollen, propolis (an antibiotic gum or resin collected from plants), royal jelly and live bees. The total crop of honey for 2000 was 9609 tonnes, about 23% of which was exported, fetching $10 million. Export of bees and bee products earned another $1.9 million.

Field crops

Although pastoral farming is the major land use in New Zealand, field crops for feed and food processing and seed crops for resowing are also important.

New Zealand wheat is primarily grown for domestic human consumption and is milled for flour. Some wheat grain and the by-products of flour milling, bran and pollard, are used for stock feed. Most wheat is grown in the South Island in the Canterbury region.

Most barley grown in New Zealand is used for the manufacture of stock feed and for malting. Exports of malting and feed barley fluctuate in response to price changes, reflecting international supply and demand. Primarily grown in the eastern North Island, maize is used as poultry feed and increasingly as a supplementary feed for pigs and other livestock. Grown mainly for threshing and green feed, oats are also used to produce milled rolled oats, oatmeal and oaten foods.

Hay and silage crops are grown for supplementary animal feed and are almost exclusively grown on the farms where they are consumed. Considerable quantities of grass seed are required annually for renewal and extension of pastures. There is an appreciable export trade in some species of grass seeds.

Horticultural crops

In recent years there have been significant increases in the area planted in horticultural crops. Major crops for the export market include kiwifruit, pipfruit, stonefruit, onions, squash, flowers and berryfruit. Almost 70% of the New Zealand pipfruit industry's export income is derived from the apple varieties Braeburn, Gala and Royal Gala, which were all developed in New Zealand. In 1998, ENZA, the marketing arm of the New Zealand Apple and Pear Marketing Board, exported 13.9 million, 18-kg cartons of apples and pears on behalf of New Zealand's 1500 pipfruit growers.

At 30 June 1998, the total area planted in summerfruits was around 3000 ha. This was mainly peaches, nectarines, apricots, plums and cherries.

Kiwifruit is one of New Zealand's most important horticultural export earners. New Zealand is a major supplier of kiwifruit globally and has led the development of the industry internationally. ZESPRI International, the global marketing subsidiary of Kiwifruit New Zealand, is the world's largest marketer of kiwifruit and the sole marketer of the ZESPRI brand of kiwifruit, exporting around 60 million trays of kiwifruit annually to about 70 countries.

Grape growing and wine production

Marlborough, Gisborne and Hawke's Bay are the major grape-producing areas. In 1998, an estimated 7356 ha were planted in producing grape vines. Grapes are grown mainly for the domestic market and for wine production.

Exports of wine increased from around 13 million litres in 1997 to over 15 million litres in 1998. The United Kingdom, which imported nearly eight million litres of wine from New Zealand in the year to 30 June 1998, is New Zealand's major export market for wine. Australia is the second-largest export market.

The 1998 season was New Zealand's largest wine vintage, producing 78,300 tonnes of grapes. Chardonnay, Muller Thurgau and Sauvignon Blanc were the most popular grapes of the season.

The organic economy

Organic agriculture has recently expanded in New Zealand. The 2000 harvest resulted in $60 million of organic exports (approximately 0.26% of total merchandise exports), mainly in fruit, fresh and processed vegetables. When all forms of "environmentally enhanced" agriculture are combined, exports in 2000 totalled almost $1 billion. Given that such exports did not exist in 1990, this represents a significant shift in the export strategy of the horticulture sector. Such a shift has not occurred in the pastoral sectors. From 1997, the entire kiwifruit crop has been grown under 'Kiwigreen' or organic methods. Kiwigreen is a system of integrated pest management designed to minimise chemical residues on kiwifruit.

Managed marketing channels

Many significant New Zealand export industries have managed marketing channels, which operate on a commercial basis or are funded by a levy on producers. These organisations are involved in activities such as international marketing and promotion, assuring market access, and product classification and compliance.

They include the New Zealand Meat Board, New Zealand Dairy Board, ENZA (the primary marketer of New Zealand pipfruit), ZESPRI International (which is focused on international marketing and which is the world's largest marketer of kiwifruit) and New Zealand Game Industry Board (which markets venison, under the Cervena brand, and deer velvet).

The forestry industry

New Zealand has a well-established forestry industry with log production and wood processing sectors. These sectors are almost entirely dependent on radiata pine wood from New Zealand's planted production forests.

The volume of roundwood harvested from New Zealand's forests has increased significantly over the past eight years, from 10 million m^3 to 17 million m^3. New planting rates suggest that the supply of logs will increase dramatically again, growing from 16.4 million m^3 in 1998 to almost 30 million m^3 by 2010.

About one-third of the national harvest is exported as logs, one-third is supplied to sawmills and plywood mills, with the remaining third supplying the pulp, paper and reconstituted panel industries.

New Zealand's wood processing industry includes four pulp and paper companies, five panelboard companies, more than 400 sawmillers and 80 remanufacturers. It currently consumes around 11 million m^3 of wood annually, with the balance of the harvest exported as logs.

By 2010, there will be another 19 million m^3 of wood available for industry to further process or to export in log form. If the surplus is processed a substantial investment of up to $6.5 billion would need to be invested in new wood-processing facilities. This could equate to an additional 134 medium-sized sawmills, 87 remanufacturing plants and either 20 panelboard mills or six pulp and paper plants added to the existing capacity. Much of this increase in wood available for harvest is concentrated in areas of the country where infrastructure is markedly inadequate and skilled, high-quality labour is in short supply. Government agencies are planning to address these issues.

Fisheries and aquaculture

New Zealand's Exclusive Economic Zone is one of the largest in the world at 1.3 million square nautical miles. This is an area 15 times New Zealand's land mass. The waters contain about 100 species of commercially significant marine fish.

In less than 30 years the commercial fishing industry has expanded from a small domestic industry to a significant export business. Approximately 650,000 tonnes are sustainably harvested from wild fisheries and aquaculture each year. The value of this harvest ranges from $1.2 to $1.5 billion annually.

Aquaculture involves mainly greenshell mussels, salmon and pacific oysters. In 1998, greenshell mussel exports were $118.2 million and salmon $35.6 million. Quantities produced and the range of species farmed have substantially increased in recent times. The aquaculture industry is researching extension of the range of species and technologies involved. Species under consideration include turbot and brill, oysters, sponges for chemical production, kingfish and rock lobster, as well as further enhancement prospects for several species such as paua (similar to abalone), scallops and snapper.

Fishing is also a popular leisure activity enjoyed by one in five New Zealanders. Popular targets are finfish (fresh water and marine), rock lobsters and shellfish. Māori cultural ties with fisheries are strong and their fishing rights are recognised in law.

The main method used to manage fisheries is a system in which catch limits are set for each fish stock. Rights to harvest fish for sale are acquired by purchasing or leasing quota. There are 31 fish species or species groups currently managed under this system, consisting of 182 different fish stocks.

For several years there has been some foreign fishing involvement in New Zealand waters, limited to the tuna fisheries. The foreign fleet dominates the high-volume, deepwater fisheries (such as hoki and southern blue whiting) and the seasonal squid fishery. However, even in these fisheries, New Zealand domestic vessels have increased their share of the catch because of significant investment by the seafood industry in new vessels.

Tourism

New Zealand has an international image as one of the world's most beautiful countries. Many tourists visit scenic places such as Milford Sound, the glaciers on the West Coast of the South Island, the glow-worm caves at Waitomo and the geysers and hot springs of the geothermal areas in the central North Island. Many international visitors also take part in adventure tourism activities such as bungy-jumping, mountain biking, white-water rafting and jet boating, as well as more traditional activities like walking and fishing.

Tourism is New Zealand's largest foreign exchange earner and an above-average contributor to total export earnings, ahead of the traditional income earners of dairy, meat, forestry and wool exports. (To place this in context, one international visitor is worth the equivalent of the fleece of 150 sheep, 1000 kg beef, 1.5 ha plantation forest or 880 kg butter.) With the growth in the global economy, especially in the Asian region, New Zealand is enjoying steady increases in visitor numbers. The Office of Tourism and Sport estimates that in the year to June 1999 international tourism contributed $3.67 billion to the economy (about 3.7% of GDP), plus international airfare revenue of $1.3 billion. A 1995 study showed that tourism, including domestic tourism, accounted for 10.3% of GDP and sustained 118,000 jobs (8.4% of the workforce).

Tourism is a growth sector and a major driver of economic opportunity for regional areas, Māori and small business. It plays a major role in enhancing international awareness and understanding of New Zealand.

About 1.75 million overseas visitors arrived in New Zealand in the year to December 2000. The forecast average annual growth rate in international visitor numbers until 2005 is 5.7%. The countries of origin of most visitors during 2000 were United States (at 11.3% of the total for 2000), followed by United Kingdom, Japan, Republic of Korea and Germany. During the 1990s, expenditure by international visitors has grown at an average annual rate of 13.1%.

Tourism markets are becoming increasingly competitive. The global branding campaign adopted by the New Zealand Tourism Board carries the tag line "100% Pure New Zealand" and relies heavily on the clean, green image of New Zealand. In order for this campaign to have integrity over time, it will be important to ensure that New Zealand's tourism industry is employing environmentally sustainable development and operational practices. In recent years, an international environmental accreditation scheme for tourism practices called "Green Globe 21" has been developed. This voluntary scheme has been operating in New Zealand for one year with support from the New Zealand Government and further expansion is likely.

Imports

The main three categories of imports into New Zealand are mechanical machinery and equipment, vehicles, parts and accessories, and electrical machinery and equipment, which together accounted for 36% of the total value of imports in the year to December 2000. The country from which New Zealand imports the most is Australia, followed by United States, Japan, People's Republic of China, Germany, United Kingdom, Malaysia, Saudi Arabia, Taiwan and Republic of Korea.

Foodstuffs figure prominently amongst New Zealand's imports, although even cumulatively they represent only about 9% of all imports in a typical year. The largest categories are beverages, fruit, sugar, cereals and processed foods.

Exports

New Zealand has a strong economic reliance on food exports. The highest two categories of merchandise exports are milk powder, butter and cheese, and meat and edible offal. Together these two categories account for almost 30% of merchandise export earnings, a proportion that has been characteristic for many years. The remaining eight of the top 10 export categories are logs, wood and wood articles (7.5% of merchandise export earnings), fish, crustaceans and molluscs (4.4%), aluminium and articles thereof (4.3%), mechanical machinery

and equipment (4.3%), fruit and nuts (3.8%), electrical machinery and equipment (3.5%), casein and caseinates (3.4%) and wool (3.0%).

Knowledge-based economy

New Zealand ranked seventh in the world for internet hosts per 1000 people according to *2000 World Development Indicators* (July 1999), and 10th in the world according to *World Competitiveness Yearbook* (May 2000). New Zealand has much of the technological infrastructure needed to become a knowledge economy and has a culture of innovation. The nucleus of a knowledge economy already exists, with 40% of households having a computer (1999), and with New Zealand leading the world in per capita expenditure on information and communications technology for five of the six years before 1999.

In 1992, in a restructuring of government research entities, Government established several Crown Research Institutes to service the technology and innovation needs of the community. The institutes undertake a wide range of research, technology development and consulting for private companies within New Zealand and overseas. They also undertake strategic public good science research for Government to complement the more applied research undertaken for the private sector.

Future policies for the knowledge economy

For New Zealand, an important aspect of the "Information Age" is that distance no longer determines the cost of communication. Patterns of international trade, concepts of national borders and the basis of decisions about where people live and work are being altered in unforeseen ways. The Labour-Alliance Coalition Government (elected in November 1999) sees New Zealand's future in the development of a knowledge-based economy. It views its task as stimulating the innovation, infrastructure and skills development needed to underpin this. (Further detail on the political spectrum of New Zealand is provided below: see "New Zealand: political framework".)

Knowledge economy policies are to include focusing on removal of any obstacles in the way of market progress (including barriers to investment in research and development (R&D)), education as the mechanism for advancing the knowledge economy and support for industry in terms of competitively awarded grants and expert advice.

Software industry

The technology sector in New Zealand already provides a significant contribution to GDP through both local and international contracts. New Zealand is renowned for its new media content industries, including animation and similar techniques.

Taxation of research and development

New Zealand's reported private-sector R&D is very low by international standards (less than a quarter of the OECD average), but this is now increasing at a faster rate than the OECD average.

In the 2000 Budget the Government announced support for private-sector R&D in the form of a grants programme, which it considered better, safer and fairer than tax concessions. However, there is currently uncertainty over the taxation of R&D, relating to whether R&D costs are classified as revenue or capital. It is not currently clear in tax law when R&D expenditure will be immediately deductible and when it will not be. The Inland Revenue Department has received submissions from the public on a new proposal which clarifies the capital/revenue boundary by permitting taxpayers to follow accounting practice to the extent that when R&D expenditure is immediately written off for accounting purposes, it will be immediately deductible for tax purposes. A decision on the proposal is forthcoming.

Education industry

International education is rapidly becoming a major earner of foreign exchange for New Zealand. In 2000, 35,169 foreign students came to New Zealand to study at secondary and tertiary institutes and at English-language schools, an increase of 24% over 1999, mainly because of growth in student numbers from China as a result of New Zealand policy changes. These students were estimated to have spent $568 million in fees and living expenses in the year to June 2000, and to have added a total of $710 million to the economy after multiplier effects are calculated. The international education sector is aiming to grow to $1 billion by 2004.

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appendix 1

Context and process

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1.2 New Zealand: foreign policy and trade policy

New Zealand's small size, geographic remoteness and an economic prosperity reliant on international trade are factors in its policies on foreign affairs and trade. There is a high level of government commitment to ensuring that policies are effective and do not impede New Zealand's international aspirations and endeavours.

Foreign policy

As a small trading nation, overseas links are important to New Zealand's prosperity and security. Historically New Zealand has made great effort to interact with other countries to neutralise the effects of geographical isolation, a small population and modest material resources. The country was prominent in the formation of the United Nations and has maintained and developed economic, political and security interests throughout the world. While New Zealand has a close geographical relationship with countries of the Pacific Rim, the other continents are of importance as trading partners and in terms of historical linkages.

New Zealand's foreign policy centres around three main national interests:

- to protect New Zealand's territorial integrity and security
- to derive maximum benefit from relations with other countries
- to promote the core values shared by most New Zealanders.

In its relationships with other countries, New Zealand has chosen to emphasise particular values. These include: human rights; disarmament in the form of reducing the threat posed by weapons, particularly nuclear weapons and weapons of mass destruction; the prevention of degradation of the environment; sustainable development; and the unique and valuable cultural values of New Zealand, including the Maori aspects of its heritage.

Development assistance

New Zealand's Official Development Assistance (NZODA) programme provides assistance to developing countries to help them better meet their peoples'

economic and social needs. NZODA is an important part of New Zealand's external relations. It helps to advance international economic prosperity, to maintain peace, security and stability, and to protect the global environment. The programme is an important means of demonstrating New Zealand's willingness to assist with the development needs of other countries and to contribute to discussion on global development issues. It forms part of New Zealand's role as a responsible international citizen. For reason of mutual benefit, New Zealand aims to promote economic growth in developing countries to increase standards of living and levels of trade and investment. All countries benefit from efforts to protect the environment and manage resources sustainably.

NZODA concentrates its country and regional support on the Pacific Island states and the developing countries of East and Southeast Asia. Beyond this, assistance is provided primarily through educational scholarships, private-sector linkages, non-governmental organisations, and through contributions to the development and relief efforts of the United Nations, Commonwealth and other multilateral organisations.

Trade policy

Trade is vital to the New Zealand economy. The country's farm producers, manufacturers and service providers need access to the spending power of large consumer markets overseas if they are to grow, prosper and provide jobs for more New Zealanders. At the same time, New Zealand relies on overseas suppliers for raw materials for its industries and for many of the goods and services that enhance the quality of life for New Zealanders.

For these reasons, New Zealand is at the forefront of negotiations to break down barriers to trade with individual countries, within geographical regions and around the world.

New Zealand is an active member of the World Trade Organization, which established a rules-based international trading system. New Zealand has also subscribed to the Asia Pacific Economic Cooperation "Bogor" goal of free and open trade and investment in the Asia Pacific region for developed countries by 2010, and developing countries by 2020. New Zealand has a long-standing established Closer Economic Relations trade agreement with Australia and recently concluded a Closer Economic Partnership agreement with Singapore.

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Context and process

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1.3 New Zealand: international legal obligations

New Zealand does not operate in isolation from the rest of the world but has entered into a range of international agreements and become a member of various multinational organisations. These instruments and organisations impose certain obligations on New Zealand.

In its Warrant (its terms of reference), the Commission was required to take account of New Zealand's international legal obligations with respect to genetic modification and the international implications of any measures that New Zealand might take with respect to genetic modification. Appendix 2 and Appendix 3 include summary and analysis of the representations made on these Warrant items during the consultation process.

This section outlines the relevant international instruments and organisations of which New Zealand is a party and to which it has obligations. These are grouped as follows:

- United Nations-sponsored instruments and organisations
- other international instruments and organisations
- bilateral Australia–New Zealand instruments and organisations.

For a brief explanation of some of points differentiating types of international agreements, see box "Conventions and protocols".

United Nations-sponsored instruments and organisations

New Zealand was a founding member of the United Nations (UN) in 1945. A New Zealand diplomat currently serves on the UN Advisory Committee on Administrative and Budgetary Questions (ACABQ). New Zealand has also been elected to the UN Economic and Social Council (ECOSOC) for the period 1998–2000.

Among the numerous instruments promoted by the UN, the Convention on Biological Diversity and the subsequent Cartagena Protocol on Biosafety were repeatedly identified in submissions to the Commission as particularly relevant to New Zealand's international obligations in relation to genetic modification.

Conventions and protocols

Convention as a generic term

Article 38 (1) (a) of the Statute of the International Court of Justice refers to "international conventions, whether general or particular" as a source of law, apart from international customary rules and general principles of international law and, as a secondary source, judicial decisions and the teachings of the most highly qualified publicists. This generic use of the term "convention" embraces all international agreements, in the same way as does the generic term "treaty". Black letter law is also regularly referred to as "conventional law", in order to distinguish it from the other sources of international law, such as customary law or the general principles of international law. The generic term "convention" thus is synonymous with the generic term "treaty".

Convention as a specific term

Whereas in the last century the term "convention" was regularly employed for bilateral agreements, it now is generally used for formal multilateral treaties with a broad number of parties. Conventions are normally open for participation by the international community as a whole, or by a large number of states. Usually the instruments negotiated under the auspices of an international organisation are entitled conventions (eg Convention on Biological Diversity).

Protocols

The term "protocol" is used for agreements less formal than those entitled "treaty" or "convention". It can refer to a number of international legal instruments. The Cartagena Protocol is a protocol based on a framework treaty. It is an instrument with specific substantive obligations that implements the general objectives of a previous framework or umbrella convention. Such protocols ensure a more simplified and accelerated treaty-making process and have been used particularly in the field of international environmental law.

When a country signs the Protocol, this indicates general support for the principles of the Protocol, as well as that country's intention to become legally bound by it. However, the Protocol does not become legally binding until a country ratifies the treaty by depositing an instrument of ratification (usually a letter of accession, acceptance or approval) with the United Nations. Once a country ratifies the Protocol, it enters into force for that country 90 days later. At this point the country is bound by the articles of the treaty and must conform to its principles under international law.

Convention on Biological Diversity

New Zealand is a party to the Convention on Biological Diversity (CBD) and ratified it on 16 September 1993.

The CBD is an international legal instrument and was negotiated under the aegis of the United Nations Environment Programme (UNEP). It was tabled on 5 June 1992 at the United Nation's Conference on Environment and Development in Rio de Janeiro, Brazil (the Rio "Earth Summit"). It entered into force as a treaty on 29 December 1993, 90 days after the 30th ratification. The CBD has 180 parties: 179 countries and the European Union.

The Convention has three objectives:

- conservation of biological diversity;
- sustainable use of the components of biological diversity; and
- fair and equitable sharing of the benefits of the use of genetic resources.

A fundamental aspect of the Convention is the requirement to develop national strategies, plans and programmes for conservation and sustainable use of biological diversity, and to integrate the conservation and sustainable use of biological diversity into plans, programmes and policies for sectors such as agriculture, fisheries and forestry and for cross-sectoral matters such as land-use planning and decision-making.

Parties are required to identify and monitor important ecosystems, species and genetic components of biological diversity, as well as processes and activities that have or are likely to have significant adverse impacts on biological diversity. Countries are then able to determine their priorities with regard to conservation and sustainable use measures which need to be undertaken.

Parties are to introduce appropriate procedures for environmental impact assessment of projects, programmes and policies that are likely to have significant adverse effects on biological diversity. The Convention also provides for the notification of activities that are likely to significantly damage biological diversity and the promotion of emergency response arrangements.

The Convention requires parties to facilitate access to their genetic resources for environmentally sound uses while affirming national sovereignty. It enables parties to obtain a fair and equitable share of benefits arising from the use of their genetic resources by other parties.

The Convention also requires parties to protect and encourage customary use of biological resources in accordance with sustainable traditional practices. It also provides for the maintenance and wider application of relevant indigenous

knowledge, innovations and practices and the equitable sharing of benefits arising from their use.

Cartagena Protocol on Biosafety

The Conference of the Parties to the Convention on Biological Diversity adopted a supplementary agreement to the Convention known as the Cartagena Protocol on Biosafety on 29 January 2000. The Protocol is open for signing until 4 June 2001. New Zealand signed on 24 May 2000 but to date has not yet ratified the protocol. It is due to enter into force on the 90th day after ratification by the 50th party to the CBD. Until the Biosafety Protocol enters into force, signatory States are obliged to refrain from actions that would defeat the object and purpose of the CBD and its protocols.

The Protocol seeks to protect biological diversity from the potential risks posed by living modified organisms (LMOs, equivalent to genetically modified organisms (GMOs) under New Zealand's Hazardous Substances and New Organisms (HSNO) Act 1996) resulting from modern biotechnology. It enshrines the "precautionary approach" as a principle of international environmental law and puts environment on a par with trade-related issues in the international area. The Protocol also establishes a Biosafety Clearing-House to facilitate the exchange of information on LMOs and to assist countries in the implementation of the Protocol.

The Protocol establishes a procedure for ensuring that countries are provided with the information necessary to make informed decisions before agreeing to the import of such organisms into their territory. The advance informed agreement (AIA) procedure requires exporters to have prior consent from importers before shipment of LMOs destined for environmental release. Bulk shipments of LMO commodities intended for food, feed or for processing are not subject to the AIA process but must have documentation that indicates the possible presence of LMOs and that they are not intended for environmental release.

The Protocol also sets up a process for the consideration of more detailed identification and labelling of LMOs that cross international borders in trade. The Protocol is specifically stated not to alter rights and obligations of members of the World Trade Organization (WTO) or under other existing international agreements.

International Plant Protection Convention

The International Plant Protection Convention (IPPC) is a multilateral treaty deposited with the Director-General of the Food and Agriculture Organization

of the United Nations (FAO) and administered through the IPPC Secretariat located in the FAO's Plant Protection Service. Some 113 governments are currently contracting parties to the IPPC. The IPPC came into force in 1952 (New Zealand ratified the treaty on 16 September 1952) and has been amended once in 1979 and again in 1997. The latest amendment is not yet in force. New Zealand accepted the new revised text of the IPPC in October 1999.

The purpose of the IPPC is to secure common and effective action to prevent the spread and introduction of pests of plants and plant products and to promote measures for their control. The Convention provides a framework and forum for international cooperation, harmonisation and technical exchange in collaboration with regional and national plant protection organisations (RPPOs and NPPOs). The IPPC plays a vital role in trade as it is the organisation recognised by the WTO in the Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement) as the source for international standards for phytosanitary measures (ISPMs) affecting trade.

Amendments to the Convention were unanimously adopted by the FAO Conference in November 1997. This revision (New Revised Text of the IPPC) updates the Convention and reflects the role of the IPPC with relation to the WTO's SPS Agreement, primarily the institutional arrangements for standard setting. The new version will come into force 30 days after acceptance by two-thirds of the contracting parties.

The IPPC provides for a Commission on Phytosanitary Measures which will serve as its governing body and will adopt international standards. Currently 13 ISPMs have been adopted, some of which are relevant to consideration of genetic modification. These international standards include: ISPM 1, Principles of Plant Quarantine as Related to International Trade (1995); ISPM 2, Guidelines for Pest Risk Analysis; ISPM 3, Code of Conduct for the Import and Release of Exotic Biological Control Agents.

World Intellectual Property Organization

The World Intellectual Property Organization (WIPO) is an international organisation promoting the use and protection of intellectual property. WIPO is one of the 16 specialised agencies of the United Nations system of organisations. It administers 21 international treaties dealing with different aspects of intellectual property protection. WIPO counts 175 nations as member states, of which New Zealand is one.

The treaties can be divided into three general groups:

- The first group of treaties defines internationally agreed basic standards of intellectual property protection in each country, such as the Paris Convention for the Protection of Industrial Property (Paris Convention) and the Berne Convention for the Protection of Literary and Artistic Works (Berne Convention).
- The second group, known as the registration treaties, ensures that one international registration or filing will have effect in any of the relevant signatory States.
- The third group is the classification treaties, which create classification systems that organise information concerning inventions, trademarks and industrial designs into indexed, manageable structures for easy retrieval.

Food and Agriculture Organization

The Food and Agriculture Organization was founded in October 1945 with a mandate to raise levels of nutrition and standards of living, to improve agricultural productivity, and to better the condition of rural populations.

FAO is now the largest autonomous agency within the United Nations system with 180 member nations plus the European Community. FAO provides direct development assistance, collects, analyses and disseminates information, provides policy and planning advice to governments and acts as an international forum for debate on food and agriculture issues.

FAO has projects and other involvement in land and water development, plant and animal production, forestry, fisheries, economic and social policy, investment, nutrition, food standards and commodities and trade. It also plays a major role in dealing with food and agricultural emergencies.

A specific priority is encouraging sustainable agriculture and rural development, a long-term strategy for the conservation and management of natural resources. This aims to meet the needs of both present and future generations through programmes that do not degrade the environment and are technically appropriate, economically viable and socially acceptable.

Codex Alimentarius Commission

The Codex Alimentarius Commission is an international organisation established jointly by the FAO and the World Health Organization (WHO). The name Codex Alimentarius (Latin for *code for food*) explains the general purpose of the Commission's work. The Codex is drawn from a collection of food standards

assembled during 1897 and 1911 in the Austro-Hungarian Empire and used as a legal reference by the courts. CAC deals with a wide range of food issues: labelling, hygiene standards, pesticide residue levels and definitions of foods.

After the establishment of FAO in 1945 and the WHO in 1948, both organisations engaged in promotion of higher food safety standards. In the 1950s international cooperation on food safety issues increased, leading to the founding of the Codex Alimentarius Commission by FAO in 1961. In 1963, FAO and WHO established a joint food standards programme, taking over some earlier efforts by European institutions to establish an international food code and adopting the statutes of the Codex Alimentarius Commission. The current membership of CAC includes 165 countries, of which New Zealand is one.

CAC works through a number of committees, which include the Codex Committee on Food Labelling (CCFL), Codex Committee on General Principles (CCGP) and an Ad Hoc Intergovernmental Task Force on Foods Derived from Biotechnology. New Zealand chairs two Codex Commodity Committees (Milk and Milk Products, and Meat Hygiene).

The General Principles of the Codex specify the ways in which member countries may "accept" Codex standards. Forms of acceptance vary depending on whether the standard is a commodity standard, a general standard, or concerns levels for pesticide or veterinary drug residues or food additives. Member States and Associate Members of FAO and/or WHO notify the Secretariat if they wish to accept the Codex standard and the form of acceptance, which can be *full acceptance*, *acceptance with minor deviations* and *free distribution*. The published standards constitute the Codex Alimentarius.

Examples of the application of Codex standards in international trade can be found in the WTO's SPS Agreement and Agreement on Technical Barriers to Trade (TBT Agreement).

The SPS Agreement designates the standards, guidelines and recommendations established by the Codex Alimentarius Commission as the benchmarks against which national measures and regulations are evaluated, in the areas of:

- food additives
- veterinary drugs and pesticide residues
- contaminants
- methods of analysis and sampling
- codes and guidelines of hygienic practice.

The TBT Agreement documents member states' commitment not to create unnecessary obstacles to trade with technical regulations and standards, including packaging, marking and labelling requirements, and analytical procedures for assessing conformity with technical regulations and standards. Article 2 of the TBT Agreement states that where technical regulations are required and relevant international standards exist or their completion is imminent, members shall use them, or the relevant parts of them, as a basis for their technical regulations.

This means that Codex standards are the benchmarks against which national food measures and regulations are evaluated within the legal parameters of the Uruguay Round Agreements.

The CCFL met in May 2000 and discussed draft recommendations on food labelling. The Task Force met in March 2000 and decided to work on a set of broad general principles for risk analysis of foods derived from biotechnology and specific guidelines on the risk assessment of foods derived from biotechnology. The Task Force noted that the Biosafety Protocol now formed part of the international regulatory framework and that the objective and provisions of the Protocol would need to be taken into account during the development of appropriate Codex texts.

Universal Declaration on the Human Genome and Human Rights

At its 27th session in November 1993, the General Conference of United Nations United Nations Educational, Scientific, and Cultural Organization (UNESCO) approved the establishment of an International Bioethics Commission, and invited the Director-General "to continue in 1994–1995 the preparation of an international instrument on the protection of the human genome ...". At its eighth meeting, the Commission finalised the Universal Declaration on the Human Genome and Human Rights (20 December 1996).

At its 29th session, on 11 November 1997, the General Conference of UNESCO adopted, unanimously and by acclamation, the Universal Declaration on the Human Genome and Human Rights.

The Universal Declaration on the Human Genome and Human Rights forms part of the framework of thinking known as bioethics, dating from the 1980s. Bioethics, the study of ethical problems arising from biological research and its application, relates to the principles that must guide human action in the face of the challenges raised by biology, including the ability to transform life as a result of advances in the field of genetics and human reproduction.

The 25 articles of the Declaration establish limits on intervention in the genetic heritage of humanity and in individuals. The international community has a moral obligation not to transgress these limits. The basic principles are:

- recognition that the human genome is part of heritage of humanity
- respect for the dignity and human rights of every individual, regardless of his/her genetic characteristics
- rejection of genetic determinism by recognising that the genome, being subject to mutations through evolution, contains "potentialities that are expressed differently according to each individual's natural and social environment".

The Declaration is a non-binding, non-treaty declaration that is imperative in nature.

Draft Declaration on the Rights of Indigenous Peoples

The Working Group on Indigenous Populations (which is a subsidiary of the Sub-Commission on Prevention of Discrimination and Protection of Minorities in the office of the United Nations High Commissioner for Human Rights) was mandated to develop international standards concerning the rights of indigenous peoples.

In 1985, the Working Group began preparing a draft declaration on the rights of indigenous peoples, taking into account the comments and suggestions of participants in its sessions, particularly representatives of indigenous peoples and governments. At its 11th session, in July 1993, the Working Group agreed on a final text for the draft declaration and submitted it to the Sub-Commission.

By resolution 1994/45 of 26 August 1994, the Sub-Commission on Prevention of Discrimination and Protection of Minorities adopted the draft declaration and submitted it to the Commission on Human Rights for consideration.

The Draft Declaration on the Rights of Indigenous Peoples consists of 19 preambular paragraphs and 45 articles and covers rights and freedoms such as: the preservation and development of ethnic and cultural characteristics and distinct identities; protection against genocide and ethnocide; rights related to religions, languages and educational institutions; ownership, possession or use of indigenous lands and natural resources; protection of cultural and intellectual property; maintenance of traditional economic structures and ways of life, including hunting, fishing, herding, gathering, timber-sawing and cultivation; environmental protection; participation in the political, economic and social life of the States concerned, in particular in matters that may affect indigenous peoples' lives and

destinies; self-determination; self-government or autonomy in matters relating to indigenous peoples' internal and local affairs; traditional contacts and cooperation across State boundaries; and the honouring of treaties and agreements concluded with indigenous peoples.

The Draft Declaration also foresees mutually acceptable and fair procedures for resolving conflicts or disputes between indigenous peoples and States, involving means such as negotiations, mediation, arbitration, national courts, and international and regional human rights review and complaints mechanisms.

The Draft Declaration further provides that the rights mentioned in it constitute the minimum standards for the survival and wellbeing of the indigenous peoples of the world.

International Covenant on Economic, Social and Cultural Rights

The 1996 International Covenant on Economic Social and Cultural Rights (ICESCR), which entered into force in 1976, spells out in more detail the economic, social and cultural rights enumerated earlier in the Universal Declaration of Human Rights (UDHR) and is legally binding on those countries that have ratified it. Together, the ICESCR, International Covenant on Civil and Political Rights (ICCPR) and UDHR are known as the International Bill of Rights. The ICESCR includes the right to work, to just and favourable conditions of work, to form and join trade unions, to family life, to an adequate standard of living, to the highest attainable standard of health, to education, and to take part in cultural life. It prohibits all forms of discrimination in the enjoyment of these rights, including on the basis of sex, and requires that countries ensure the equal rights of women and men.

Convention on International Trade in Endangered Species of Wild Fauna and Flora

The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) is an international treaty that was drawn up in 1973 to protect wildlife against over-exploitation and to prevent unregulated international trade from threatening plant and animal species with extinction. CITES came into effect in January 1975 and currently has 152 members. New Zealand acceded to the treaty on 10 May 1989 and ratified it on 8 August 1989.

CITES comprises three appendices: Appendix I, which protects threatened species from all international commercial trade; Appendix II, which regulates trade in species that are not threatened with extinction but may become threatened if trade

goes unregulated; and Appendix III, which gives countries the option of listing native species already protected within their own borders.

The member countries have committed to the principles established by CITES: in particular, that any trade in protected plant and animal species is sustainable and a process through which member countries work together to ensure that wildlife trade is carried out in accordance with the treaty.

CITES is part of the UN system of organisations and its secretariat is administered by UNEP.

World Health Organization and Ottawa Charter for Health Promotion

The WHO was founded in 1948. It is a specialised agency of the United Nations with 191 member states. WHO has four main functions:

- to give worldwide guidance in the field of health
- to set global standards for health
- to cooperate with governments in strengthening national health programmes
- to develop and transfer appropriate health technology, information and standards.

The Ottawa Charter was promulgated by the First International Conference on Health Promotion held in Ottawa, Canada, in November 1986, under the aegis of the WHO. Its basic premise is expressed as:

> Health promotion is the process of enabling people to increase control over, and to improve, their health. To reach a state of complete physical mental and social well being, an individual or group must be able to identify and to realize aspirations, to satisfy needs, and to change or cope with the environment. Health is, therefore, seen as a resource for everyday life, not the objective of living. Health is a positive concept emphasizing social and personal resources, as well as physical capacities. Therefore, health promotion is not just the responsibility of the health sector, but goes beyond healthy lifestyles to well being.

World Bank

The World Bank is a multilateral lending agency consisting of five closely-associated institutions: the International Bank for Reconstruction and Development (IBRD), the International Development Association (IDA), the International Finance Corporation (IFC), the Multilateral Investment Guarantee Agency (MIGA) and the International Centre for Settlement of Investment Disputes (ICSID). The common objective of the institutions is to help raise the living

standards in developing countries by channelling financial resources from developed countries to them. New Zealand joined the World Bank in 1961.

New Zealand has subscribed to a total of 7236 shares in the IBRD, which represents 0.51% of the total voting shares. The shares have a total par value of US$723.6 million, although over 90% of this amount has not been called up but, together with the uncalled subscription of the other member countries, acts as a guarantee for the bank's borrowing in the financial markets. New Zealand owns 2025 fully paid shares in the IFC which have a total par value of US$2.025 million.

Other international instruments and organisations

Other instruments and organisations that do not come under the umbrella of the United Nations are also of importance to New Zealand in its international obligations. Chief among these is the WTO.

World Trade Organization

With the completion of the Uruguay Round of trade negotiations, WTO came into existence on 1 January 1995 as a forum for the facilitation of international trade. The WTO was established under the Marrakesh Agreement or General Agreement on Tariffs and Trade (GATT) 1994.

The Uruguay Round agreements represented a milestone in the multilateral trading system because, for the first time, agriculture and food were incorporated under operationally effective rules and disciplines.

Countries participating in the round of negotiations recognised that measures ostensibly adopted by national governments to protect the health of their consumers, animals and plants could become disguised barriers to trade as well as being discriminatory. Consequently, the SPS Agreement, the TBT Agreement and the Agreement on Trade Related Aspects of Intellectual Property Rights (TRIPS Agreement) were included among the Multilateral Agreements on Trade in Goods, annexed to the 1994 Marrakesh Agreement.

The WTO does not engage in standard setting itself but rather ensures that standards (and the procedures for their assessment and for achieving conformity with them) do not create unnecessary obstacles to international trade.

SPS Agreement and TBT Agreement

The SPS Agreement acknowledges that governments have the right to take sanitary and phytosanitary measures necessary for the protection of human

health. However, the SPS Agreement requires them to apply those measures only to the extent required to protect human health. It does not permit member governments to discriminate by applying different requirements to different countries where the same or similar conditions prevail, unless there is sufficient scientific justification for doing so.

The TBT Agreement seeks to ensure that technical regulations and standards, including packaging, marking and labelling requirements, and analytical procedures for assessing conformity with technical regulations and standards, do not create unnecessary obstacles to trade.

The SPS and TBT Agreements both acknowledge the importance of harmonising standards internationally so as to minimise or eliminate the risk of sanitary, phytosanitary and other technical standards becoming barriers to trade.

For example, in its pursuance of harmonisation with regard to food safety, the SPS Agreement has identified and chosen the standards, guidelines and recommendations established by the CAC for food additives, veterinary drug and pesticide residues, contaminants, methods of analysis and sampling, and codes and guidelines of hygienic practice. This means that Codex standards are considered scientifically justified and are accepted as the benchmarks against which national measures and regulations are evaluated.

As a member of the WTO, New Zealand is obliged to notify the WTO of changes to food standards to allow other members to comment. Notification is required of any new or changed standards that may have a significant trade effect and that depart from the relevant international standard (or where no such standards exist). The Ministry of Agriculture and Forestry (MAF) is the contact point in New Zealand for SPS compliance and queries.

TRIPS Agreement

The TRIPS Agreement, which came into effect on 1 January 1995, is a comprehensive multilateral agreement on intellectual property rights.

The basic principles of the TRIPS Agreement are a commitment that the nationals of other parties must be given no less favourable protection of intellectual property than that given a party's own nationals and a most-favoured-nation clause, under which any advantage a party gives to the nationals of another country must be extended immediately and unconditionally to the nationals of all other parties, even if such treatment is more favourable than that which it gives to its own nationals.

The Agreement covers copyright, trademarks and service marks, geographical indications, patents, trade secrets and know-how, and anti-competitive practices

in contractual licences. It also sets out the obligations of member governments to provide procedures and remedies under their domestic law to ensure that intellectual property rights can be effectively enforced, by foreign right holders as well as by their own nationals.

In addition to complying with the provisions of the Paris Convention, the TRIPS Agreement requires that 20-year patent protection be available for all inventions, whether of products or processes, in almost all fields of technology. Inventions may be excluded from patentability if their commercial exploitation is prohibited for reasons of public order or morality; otherwise, the permitted exclusions are for diagnostic, therapeutic and surgical methods, and for plants and animals (other than microorganisms) and essentially biological processes for the production of plants or animals (other than microbiological processes). Plant varieties, however, can be protected either by patents or by a system such as breeders' rights provided in the International Convention for the Protection of New Varieties of Plants.

Dispute settlement relating to intellectual property takes place under the integrated GATT dispute settlement procedures as revised in the Uruguay Round. Transitional provisions for developed, developing and least developed countries are provided. Subject to certain exceptions, the general rule is that the obligations in the agreement would apply to existing intellectual property rights as well as to new ones.

International Union for the Protection of New Varieties of Plants

The International Union for the Protection of New Varieties of Plants (UPOV, from the French *Union internationale pour le protection des obtentions végétale*) is an intergovernmental organisation, based on the International Convention for the Protection of New Varieties of Plants, as revised since its signature in Paris on 2 December 1961. The objective of the Convention is the protection of new varieties of plants by an intellectual property right. The main activities of UPOV are concerned with promoting international harmonisation and cooperation, mainly between its member States, and with assisting countries, in the introduction of plant variety protection legislation. New Zealand has been a member of UPOV since 1981.

Like all intellectual property rights, plant breeders' rights are granted for a limited period of time, at the end of which varieties protected by them pass into the public domain. The rights are also subject to controls, in the public interest, against any possible abuse. Authorisation of the holder of a plant breeder's right is

not required for the use of the variety for research purposes, including its use in the breeding of further new varieties.

To be eligible for protection, varieties have to be:

- distinct from existing, commonly known varieties
- sufficiently uniform
- stable
- new in the sense that they must not have been commercialised prior to certain dates established by reference to the date of the application for protection.

Organisation for Economic Co-operation and Development

The forerunner of the OECD was the Organisation for European Economic Co-operation (OEEC), which was formed to administer American and Canadian aid under the Marshall Plan for reconstruction of Europe after World War II. Since it took over from the OEEC in 1961, the OECD vocation has been to build strong economies in its member countries, improve efficiency, hone market systems, expand free trade and contribute to development in industrialised as well as developing countries. New Zealand became a member of the OECD in 1973.

The OECD groups 30 member countries in an organisation that, most importantly, provides governments with a setting in which to discuss, develop and perfect economic and social policy. They compare experiences, seek answers to common problems and work to coordinate domestic and international policies that increasingly in today's globalised world must form a web of even practice across nations. Their exchanges may lead to agreements to act in a formal way; for example, by establishing legally binding codes for free flow of capital and services, agreements to crack down on bribery or to end subsidies for shipbuilding. But more often, their discussion makes for better informed work within their own governments on the spectrum of public policy and clarifies the impact of national policies on the international community. And it offers a chance to reflect and exchange perspectives with other countries similar to their own.

OECD countries produce two-thirds of the world's goods and services, and membership is open to countries committed to a market economy and a pluralistic democracy. The core of original members has expanded from Europe and North America to include Japan, Australia, New Zealand, Finland, Mexico, Czech Republic, Hungary, Poland and Korea.

Asia Pacific Economic Co-operation

Asia Pacific Economic Co-operation (APEC) is a grouping of regional economies created in 1989 to promote growth and economic development in the Asia–Pacific Region. APEC works in three broad areas:

- advancing free and open trade and investment
- making it easier to do business, through improving trade rules and reducing 'red tape'
- promoting economic and technical cooperation.

APEC's Agricultural Technical Cooperation Experts' Group (ATC) is the main body working on biotechnology within APEC. At its June 2000 meeting in Darwin, APEC Ministers Responsible for Trade endorsed a report by the ATC on work already undertaken in the biotechnology area, and directed the ATC to proceed with its agreed work programme.

Operating from a principle of development and utilisation of agricultural biotechnology in a safe and equitable manner, APEC's main focus is on technical cooperation and capacity-building aimed at:

- facilitating the safe and effective use of biotechnology for its contribution to society through the development of transparent and science-based national approaches for risk assessment and risk management
- encouraging effective communications approaches, thereby enhancing public awareness and understanding of biotechnology.

The ATC's work programme for 2000 and the medium term also includes the issues of science-based assessment of the products of biotechnology, as well as transparency and information exchange.

Asian Development Bank

The Asian Development Bank (ADB) is a development finance institution. Established in 1965, it is owned by 37 countries from the Asia–Pacific region, including New Zealand and 16 countries from Europe and North America. The ADB's principal function is to promote and finance the economic and social advancement of its 33 Asia–Pacific developing country members.

New Zealand currently holds 27,170 shares in the ADB, about 2.6% of the bank's voting shares. The shares have a total par value of US$381.35 million. The country also makes contributions to the periodic replenishment of the ADB's Asian Development Fund, the bank's facility for lending to its poorest developing

member countries. New Zealand has contributed over $51 million to the ADB since 1974.

Bilateral Australia–New Zealand instruments and organisations

Various Trans-Tasman agreements exist to simplify or strengthen the interaction of Australia and New Zealand. The most significant instrument in terms of genetic modification relates to joint food standards.

ANZCERTA

The Australia New Zealand Closer Economic Relations Trade Agreement (ANZCERTA) is the primary instrument governing the conduct of trade between Australia and New Zealand in goods and services. Its central provision creates a comprehensive bilateral free trade area that is consistent with GATT/WTO obligations regarding the formation of free-trade areas. There is now free trade in goods and virtually free trade in services.

The objectives of the ANZCERTA are:

- to strengthen the broader relationship between Australia and New Zealand
- to develop closer economic relations between Australia and New Zealand through a mutually beneficial expansion of free trade between the two countries
- to eliminate barriers to trade between Australia and New Zealand in a gradual and progressive manner under an agreed timetable and with a minimum of disruption
- to develop trade between New Zealand and Australia under conditions of fair competition.

The Closer Economic Relations (CER) Agreement was signed in 1983, but has undergone several reviews that have accelerated, widened and deepened the scope and implementation of the Agreement. In addition, over the past 10 years ANZCERTA has been augmented by a number of other agreements and arrangements. CER is now an umbrella term that covers a wide range of instruments governing the wider trade and economic relationship. Two components of CER relevant to the Commission's Warrant are the Australia New Zealand Joint Food Standards Treaty and the Trans-Tasman Mutual Recognition Arrangement.

Australia New Zealand Joint Food Standards, ANZFA and ANZFSC

A National Food Authority was established in Australia in 1991 after an intergovernmental agreement between the Commonwealth, States and Territories to develop food standards that were nationally uniform. New Zealand joined this partnership in 1996 with the operational commencement of the Treaty for a joint Food Standards System. The Australia New Zealand Food Authority (ANZFA) was then formed, based on the former National Food Authority. The (Commonwealth) Australia New Zealand Food Authority Act 1991 (ANZFA Act) contains the current form of the enabling legislation. ANZFA conducts risk assessments and undertakes consultation to develop recommended food standards but it does not have the authority to make final decisions to adopt new food standards. These decisions are made, through consensus or a majority vote, by Health Ministers from Australia, New Zealand and each of the Australian States and Territories, sitting as the Australia New Zealand Food Standards Council (ANZFSC).

The Agreement between the Government of New Zealand and the Government of Australia Establishing a System for the Development of Joint Food Standards (referred to here as the Treaty) established an official partnership between New Zealand and Australia in relation to food standards. Australia and New Zealand signed the Treaty on 5 December 1995 and it came into effect on 5 July 1996.

The objectives of the Treaty are:

- to reduce unnecessary barriers to trade
- to adopt a joint system for the development of food standards for Australia and New Zealand
- to provide for the timely development and adoption of food standards appropriate for both Member States
- to facilitate the sharing of information between the Member States on matters relating to food.

In signing the Treaty, New Zealand agreed to join in the national Australian food standards system. The joint Food Standards System focuses on the development of an Australia New Zealand Food Standards Code (the 'Joint Code'), a project which is now almost complete. The Joint Code is due for final consideration by the ANZFSC later this year. The Treaty provides for joint food standards

covering:

- the safety of food, including its microbiological status
- the composition of food, including the maximum or minimum amounts, where appropriate, of contaminants, residues, additives or other substances that may be present in food
- the method of sampling and testing the food to determine its composition and safety
- the production, manufacture or preparation of food
- materials, containers, appliances or utensils used in relation to food
- the packaging, storage, carrying, delivery, or handling of food
- any information about food, including labelling, promotion and advertising
- such other matters affecting food as may affect the health of persons consuming food
- the interpretation of other standards.

At this stage, the Treaty relates only to ANZFA's work in developing food standards. Specifically, the Treaty excludes:

- specification of maximum residue limits for agricultural and veterinary chemicals in food
- specification of food hygiene provisions including requirements for food safety programmes or other means of demonstrating the safety and compliance of foods
- export requirements relating to third-country trade.

New Zealand may 'opt out' of a food standard if it considers the standard to be inappropriate on the grounds of "exceptional health, safety, third country trade, environmental or cultural factors". To date, New Zealand has not formally opted out of any food standard. Under Article 6 of the Treaty, an annual Partnership Agreement is established between the New Zealand Minister of Health and the chairperson of ANZFA. Under these arrangements, New Zealand makes financial contributions to ANZFA's work in developing food standards for both countries, but not to ANZFA functions outside the Treaty. This contribution is in proportion to population share.

Trans-Tasman Mutual Recognition Arrangement

The Trans-Tasman Mutual Recognition Arrangement (TTMRA) came into effect in 1998, two years after the Joint Food Standards Treaty. It provides that any product sold in either Australia or New Zealand can lawfully be sold in the other

country without needing to meet any additional standards, and that a person registered to practise an occupation in one country is entitled to practise an equivalent occupation in the other.

Food is covered under the TTMRA, so that any genetically modified food that can lawfully be sold in one jurisdiction can under the TTMRA be sold in the others. Permanent exemptions to the TTMRA must be agreed unanimously by the parties.

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appendix 1

Context and process

Section contents

1.4 New Zealand: political framework

To provide a context for some of the representations to the Commission (see Appendices 2 and 3) and for certain recommendations by the Commission (see the Report), this section describes key features of New Zealand's political framework. It outlines the nature of New Zealand's:

- constitution
- central government
- political spectrum
- local government.

It then offers a context for the present Commission by describing the role of Royal Commissions in New Zealand.

Constitution

New Zealand has a constitution, although it is not set out in one all-inclusive document. It consists of a series of formal legal documents, decisions of the courts (common law) and long-standing recognised practices, some of which are described as constitutional conventions.

New Zealand's constitution comes from the Westminster, or British, tradition. It has evolved slowly over many years since New Zealand became independent of Britain. Although it can be argued that this makes the New Zealand constitution weaker than some others, it also makes it more flexible.

The Treaty of Waitangi, signed in 1840, is a central document in New Zealand's evolving constitution and legislative development. (A copy of the Treaty is contained within the Report.)

In essence, the Treaty sought to secure a place in which two cultures could coexist[1]. In recent years, there has been a focus on the intent (or "principles") of

[1]It was inherent in the Treaty's terms that Maori customary values would be properly respected, but it was also an objective of the Treaty to secure a British settlement and a place where two peoples could fully belong. To achieve that end the needs of both cultures must be provided for, and where necessary, reconciled. (*Report of the Waitangi Tribunal on the Mangonui Sewerage Claim — Wai 17*. 1988. Waitangi Tribunal, Wellington: 60.)

the Treaty. The Waitangi Tribunal, established in 1975, has chosen to concentrate on the spirit of the Treaty rather than exclusively on its written terms, thereby emphasising the mutual obligations and responsibilities of both parties in a constantly evolving society.

The principles of the Treaty, as outlined by the Waitangi Tribunal, cover the protection and preservation of Maori property and taonga; custom and cultural values (including protection of tino rangatiratanga); partnership and mutual respect between both parties; recognition and equal weighting of Maori views, values, law and policies in decision-making; active protection of Maori Treaty interests by the Crown; autonomy of Maori in determining their own affairs; to allow Maori the option to wholly or partially adopt their cultural practices; and recognition that ongoing development and evolution of tikanga is integral to Maori culture.

Notwithstanding the absence of direct reference to the Treaty in legislation, recent cases support the proposition that Treaty principles may be a relevant consideration. Guidelines for the preparation of legislation adopted by Cabinet in 1987 state that: "all prospective legislation should be examined with regard to its implications for the Treaty at policy approval stage". In effect, the Treaty has become "part of the legal backdrop against which the legislation must be read" (Burrows, 1992).

The implications of the Treaty of Waitangi in the genetic modification debate are developed more fully in the Report.

The Constitution Act 1986 is the principal formal charter. This Act specifies that the Queen, the Sovereign in right of New Zealand, is the Head of State of New Zealand and that the Governor-General appointed by her is her representative. Her representative can, in general, exercise all the powers of the Sovereign. That conferring of power is described in the Letters Patent Constituting the Office of the Governor-General of New Zealand, most recently revised in 1983. Other relevant Acts are State Sector Act 1988, Electoral Act 1993 and Judicature Act 1908, as well as Ombudsmen Act 1975, Official Information Act 1982, Public Finance Act 1989 and New Zealand Bill of Rights Act 1990. These Acts, however, are not "supreme laws" and may be changed by a further Act of Parliament.

New Zealand is an independent sovereign nation and is called a "Realm" because it is a monarchy. New Zealand ceased being a Dominion in 1947. The Realm of New Zealand comprises New Zealand, Tokelau and the Ross Dependency and the self-governing states of Cook Islands and Niue.

As Head of State, Queen Elizabeth's formal New Zealand title is "Elizabeth the Second, by the Grace of God, Queen of New Zealand and Her Other Realms and Territories, Head of the Commonwealth, Defender of the Faith".

The Queen's personal representative in New Zealand is formally styled "The Governor-General and Commander-in-Chief in and over New Zealand". The Governor-General is appointed by the Queen on the advice of the New Zealand Government, usually for a term of five years.

Central government

New Zealand central government has three branches: the Legislature (Parliament), the Executive (New Zealand Government) and the Judiciary. Power is divided between these to prevent any single branch from acting against the basic constitutional principles of the country. Although each branch has a different role, they are not totally separate.

The Legislature

Parliament consists of a single house (the House of Representatives) whose members are elected every three years by universal suffrage.

The Executive

Cabinet is the central decision-making body of executive government. All major decisions are taken through the Cabinet process and Cabinet meetings are confidential.

Cabinet's role is to take decisions in a wide range of areas including:

- major policy issues
- important spending proposals and financial commitments
- proposals involving new legislation or regulations
- matters that concern the interests of a number of government departments
- controversial matters
- ratification of international treaties and agreements.

The Executive Council is the part of the executive branch of government that carries out formal acts of government. By convention, membership of the Executive Council comprises all Ministers of the Crown, whether those Ministers are inside or outside the Cabinet. Ministers have specific areas of responsibility called "portfolios" and may be assisted in these by Deputy or Associate Ministers or Parliamentary Under-Secretaries.

The Executive Council is the highest formal instrument of government and is the institution through which the government as a whole advises the Governor-General, normally by recommendations to make Orders in Council. Apart from

Acts of Parliament, Orders in Council are the main method of implementing government decisions requiring legal force.

The Judiciary

The independence of the Judiciary, a principle that ensures that judges are free of political interference, is an important principle of the New Zealand constitution. This is reflected in the standing orders of the House of Representatives, which prohibit Members of Parliament from criticising a judge. A judgment may be criticised but personal attacks on, or attempts to influence, a judge are not allowed. Although Parliament makes laws, it is the job of the Judiciary to interpret and apply those laws in cases that come before the courts.

Political spectrum

At least once every three years, New Zealand holds a General Election to choose its Parliament. The New Zealand Parliament is elected using the Mixed Member Proportional Representation (MMP) electoral system.

Under MMP, voters have two votes:

- a Party Vote for the party the voter most wants to be represented in Parliament
- an Electoral Vote for the Member of Parliament the voter wants to represent their electorate (area).

Voters' residential addresses decide which electorate they will be in. The New Zealand Parliament includes General and Maori electorates. Qualified electors who are New Zealand Maori or descendents of New Zealand Maori can choose whether they want to vote for a General electorate or a Maori electorate. The voting age is 18.

The political parties which gained at least 5% of the vote in the 1999 election were (in alphabetical order) ACT New Zealand, the Alliance, the Green Party of Aotearoa New Zealand, the New Zealand Labour Party, and the New Zealand National Party. As a result of that election, the current government is a coalition made up of the Labour Party and the Alliance.

ACT, which gained 7.0% of the vote in 1999, is founded on the following two principles:

> That individuals are the rightful owners of their own lives and therefore have inherent freedoms and responsibilities.
>
> That the proper purpose of government is to protect such freedoms and not to assume such responsibilities.

The Green Party gained 5.2% of the vote in 1999. The Greens:

> realise a society is sustainable only when it acts in harmony with the natural world.
>
> are united in their belief that ecological economics and a new political consciousness can achieve this harmony.
>
> take advice from experts and link it to local decision-making and personal responsibility for the results of personal action.

The Labour Party, which gained 38.7% of the vote in 1999, and the Alliance, which gained 7.7% of the vote in 1999, formed a coalition government with the following objectives:

1. to implement a policy platform which reduces inequality, is environmentally sustainable, and improves the social and economic wellbeing of all New Zealanders,
2. to restore public confidence in the political integrity of Parliament and the electoral process,
3. to provide stable and effective long term government for New Zealand without losing the distinctive political identity of either party, and
4. to act in good faith between the coalition partners.

The National Party, which gained 30.5% of the vote in 1999, expresses its principles as wanting:

> a confident and ambitious people driven by the freedom, self-reliance and enterprise of individuals who are:
>
> passionate for excellence, achievement and success,
>
> committed to a united society based on tolerance, diversity, independence, and
>
> determined to make their community and environment a better place.

Local government

The basic role of local authorities is to enable local communities to make collective choices and decisions and to undertake collective activity. This gives New Zealanders a way to influence decisions shaping the communities in which they live, through their locally elected representatives. Each local authority has a degree of discretion over the scope of the specific activities it undertakes or funds.

Local government is responsible for local policy-making, specific local service delivery and aspects of local regulation. Local authorities are also active in community leadership and advocacy on behalf of their districts.

Local authorities include Regional Councils and territorial authorities, that is, District Councils and City Councils. Regional Councils have overarching responsibilities, such as biosecurity (including pest management), catchment control, harbour administration, hazardous substances management, regional emergency management, regional land transport and resource management.

Within each of the country's 15 Regional Councils are City and/or District Councils, of which there are a total of 76. The exception is four unitary authorities which fulfil the functions of both a Regional Council and a territorial authority. City Councils are specific to a single city, but a District Council may comprise a city and its surrounding area, or several smaller towns and the area around them. The responsibilities of a City or District Council include community wellbeing and community development, emergency management, environmental management (including waste management), infrastructure (roading and transport, sewerage, water and stormwater), public health and safety issues (including building control), recreation and resource management (including land use planning and development control).

Some territorial authorities have become actively involved in the debate about genetic modification. For example:

- The Far North District Council sought public submissions on their District Plan, with some submitters suggesting that the district council take a stance on the issue of genetic modification. The Council is awaiting the findings of the Commission before developing its own policies on the matter. However, it decided in March 2001 to ask Government to make compulsory the current voluntary moratorium on the release of genetically modified organisms.
- The Whangarei District Council received a delegation from opponents of genetic modification who presented a petition opposing the technology signed by 2300 Whangarei residents and 93 businesses. One District Council member proposed declaring Whangarei District free of genetic modification, but the Mayor and other Councillors voted in favour of awaiting the outcome of the Commission before taking further action.
- In the Auckland area, Waiheke, Eden/Albert and Devonport Community Boards have recently passed symbolic resolutions supporting the establishment of "GE-free" zones. The wording encourages and supports local businesses and individuals to refrain from using any genetically modified organisms.
- The Kapiti Coast District Council invited written submissions from the public on a discussion document entitled "Genetic Engineering —

Declaration of Kapiti as a Genetic Engineering-Free Zone". Submissions were considered by a Council subcommittee in March 2000. The subcommittee rejected a motion to declare Kapiti "Genetic Engineering Free for Crops and Food" by seven votes to six.

- In Nelson, citizens organised a petition calling for the city to be declared a genetic modification-free zone. The Mayor of Nelson has publicly supported this move. In 2000, Nelson City Council twice narrowly voted against becoming the first city to become "GM free" as a symbolic act. However, on 5 April 2001, the Council formally agreed to declare Nelson New Zealand's first "GE-free" city. The Council hopes that its decision will enhance Nelson's image as a clean, green city, and have a positive effect on promoting Nelson's tourism and economy. The city will be philosophically against genetic modification, particularly genetically modified foods. This status is not enforceable on other organisations in Nelson.
- Tasman District Council rejected a proposal to declare Tasman District "GE free" in late October 1999.
- Other territorial authorities such as Hurunui District Council, Hamilton City Council and Northland Regional Council made formal submissions to the Commission. Hamilton City Council was accorded Interested Person status because about 25% of New Zealand's science research is undertaken in a life sciences research cluster in or near Hamilton City: the Council declared its belief in the potential economic benefits of supporting businesses that utilise the careful application of biotechnology.

Royal Commissions

A Royal Commission is the highest level of response available to the New Zealand Government when considering an inquiry into a particular issue. Royal Commissions are convened to investigate any matter of major public importance that is of concern to the government of the day, such as matters of considerable public anxiety or where a major lapse in government performance appears to be involved.

Other options are also available to Governments faced with an issue of concern, such as Commissions of Inquiry, Statutory Inquiries, Ministerial Inquiries and so on.

The current Royal Commission on Genetic Modification is the first Royal Commission to be held since the Royal Commission on Social Policy in 1986.

Background to the Royal Commission on Genetic Modification

Genetic modification was developed in the 1970s. It is already an integral part of biological and medical research and has medical, commercial and industrial applications. Agricultural and food-related uses of genetic modification are a more recent development and have attracted great public interest in New Zealand. (Further information is provided in this volume: see "Genetic modification technology and its uses in New Zealand".)

In May 1999, Government established the Independent Biotechnology Advisory Council to help New Zealanders explore and consider issues of biotechnology. In October 1999, the Green Party presented to Parliament a petition of 92,000 signatures calling for a Royal Commission on genetic modification and a moratorium on field trials.

After a general election in November 1999, the new government considered that there was significant public interest in and uncertainty and concern about the topic of genetic modification, and that official investigation was warranted. The Speech from the Throne at the Opening of Parliament on 21 December 1999 announced that a Royal Commission would be established on the topic:

> It is recognised that one area of research and development has led to significant public concerns. That is the area of genetic modification. A Royal Commission into Genetic Modification will be established. Until it has reported, a moratorium will be imposed on the commercial planting of genetically modified crops. Very strict conditions will apply to the consideration of any application for field trials until such time as the Commission reports on the wider issues.
>
> My government will require a simple and comprehensive system of labelling of genetically modified food, whether "substantially equivalent" or not, and of any food derived from genetically modified organisms.
>
> Honourable Members. The concerns about genetically modified foods and organisms reflect wider public interest in environmental and conservation issues. My government shares that interest.

A working party was established to consider the terms of reference, budget and other details for the Royal Commission. The working party was led by the Ministry for the Environment, and included officials from the Department of the Prime Minister and Cabinet, the Ministry of Research, Science and Technology, the Ministry of Health, Treasury, the Department of Conservation, the Ministry of Fisheries, Te Puni Kokiri (the Ministry of Maori Development), the Environmental Risk Management Authority, the Ministry of Foreign Affairs and

Trade, the State Services Commission, the Ministry of Agriculture and Forestry and the Department of Internal Affairs.

On 17 April 2000, the Royal Commission on Genetic Modification and a voluntary moratorium on the release of genetically engineered organisms were announced. The voluntary moratorium on future applications for general release and field tests of genetically modified organisms was the result of discussion between the Government, industry and relevant research groups. The Government reserved the right to legislate to give effect to a moratorium should the voluntary agreement prove ineffective. This strategy allowed research to continue but ensured that nothing irreversible occurred while the Commission was in process. (Further information is provided later in this volume: see "Processes of the Commission: Establishment of the Commission".)

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appendix 1

Context and process

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2.1 Genetic modification legislation and regulation in New Zealand

Introduction

New Zealand has two key pieces of legislation that currently control genetic modification, genetically modified organisms and environmental protection from risks associated with genetically modified organisms. They are the Hazardous Substances and New Organisms (HSNO) Act 1996 and the Biosecurity Act 1993.

There are also other enactments and associated regulations that either deal with a specific aspect of genetically modified organisms or genetically modified products (such as the Medicines Act 1981 and the Food Act 1981) or potentially could be used or applied to genetically modified organisms and genetically modified products and their uses (such as conservation or environmental protection and management legislation, consumer and intellectual property laws).

Key legislation for genetic modification

Hazardous Substances and New Organisms Act

The purpose of the HSNO Act is "to protect the environment, and the health and safety of people and communities, by preventing or managing the adverse effects of hazardous substances and new organisms". Genetically modified organisms come under the definition and regulation of new organisms by the Act.

It should be noted that the Act does not regulate or provide for any controls on genetically modified organisms once they have been approved for release into the environment. If genetically modified organisms are released (with or without approval), any restrictions on their movement or management would have to be under other legislation, such as the Biosecurity Act, the Conservation Act 1987 or the Health Act 1956.

The Environmental Risk Management Authority (ERMA) was established under the HSNO legislation. It is responsible for granting or withholding approval for:

- importing any genetically modified organisms into containment
- developing any genetically modified organism
- conducting contained field trials
- releasing any contained or imported genetically modified organism.

ERMA's responsibility is to prevent or manage any adverse effects of new organisms, including genetically modified organisms.

Its task intersects with several other agencies:

- **Ministry of Agriculture and Forestry** (MAF). ERMA and MAF have entered into a Memorandum of Understanding (MOU) and an operational agreement. The MOU deals with the interrelationships in:
  - administration of the new organisms provisions of the HSNO Act and the importation control provisions of the Biosecurity Act
  - administration of approvals under HSNO and the Agricultural Compounds and Veterinary Medicines (ACVM) Act 1997 and the transitional provisions under these two Acts
  - coordination of policies in New Zealand and internationally.

  The MOU recognises the role of MAF in managing the border control and quarantine issues regarding new organisms, while ERMA exercises the clearance or approval process for any new organism identified to enter the country. The operational agreement relates to the responsibilities each organisation has for the containment of new organisms. MAF sets the import health standards for containment facilities and operators. ERMA must ensure that, where an approval is given to import any new organism into containment, the containment meets the controls and standards approved under the HSNO Act. The agreement provides that the HSNO containment requirements will be enforced by MAF inspectors acting under the Biosecurity Act.
- **Australia New Zealand Food Authority** (ANZFA). ERMA and ANZFA have an MOU under which they have agreed to notify and exchange

information about applications to develop or vary a standard allowing the sale of genetically modified foods or food ingredients in the case of ANZFA, and all applications for approval of genetically modified organisms (excluding development in containment) in the case of ERMA. They have also agreed, as far as is practicable, to coordinate approvals for the release of genetically modified organisms, genetically modified foods and ingredients derived from genetically modified organisms.

- Other government agencies also have obligations, and potentially powers of enforcement, under the HSNO Act, such as **Occupational Safety and Health Service**.
- Under section 97(g) of the HSNO Act, the chief executive of **Ministry of Health** has a specific duty and power to enforce the provisions of the Act to protect public health.
- **Department of Conservation** has a statutory role in advising on the impacts of new organisms that are being considered for introduction to New Zealand. Under section 53(4) of the Act, ERMA is required to notify the Department of Conservation of applications for approval of new organisms. Under section 58, the Authority is required to have particular regard to any submissions made by the Department of Conservation where any application is for approval to import, develop, field test or release a new organism.
- **Ministry for the Environment** (MfE) is responsible for administering HSNO and providing policy advice to Government. It also monitors ERMA's activities.

Biosecurity Act

This Act provides the mechanisms for the exclusion, eradication and management of pests and other unwanted organisms in New Zealand. New organisms, including genetically modified organisms, are treated as risk goods under the Biosecurity Act. New organisms that have containment approval from ERMA are "restricted organisms" under the Biosecurity Act and must be held in a containment facility approved under that Act.

Under section 101 of the Act, the Minister of Biosecurity formally recognises the Director-General of Health as having responsibilities for human health matters that could be adversely affected by certain organisms. The Ministry of Health uses powers under the Biosecurity Act to exclude, eradicate, and effectively manage pests and unwanted organisms of public health significance.

The Ministry is also able to use the powers under the Biosecurity Act to manage the exclusion, eradication or control of pests or organisms that pose a threat to

public health. This responsibility is carried out under a separate purchase agreement between the Minister of Biosecurity and Ministry of Health.

Legislation applicable to genetic modification

Resource Management Act

The Resource Management Act 1991 (RMA) provides the framework for management of use of the environment, including air, water, soil, biodiversity, the coastal environment, noise, subdivision and land use planning in general.

Ministry for the Environment is responsible for administering the RMA. The RMA operates through consent authorities (regional, district and city councils and, occasionally, the Ministers for the Environment or of Conservation), which grant permission by way of resource consents to use or develop a natural or physical resource and/or carry out an activity that affects the environment.

Granting of resource consents ensures that an activity can proceed provided any adverse effects on the environment are avoided, remedied or mitigated.

There are five types of resource consent under the RMA:

- land use consent
- subdivision consent
- water permit
- discharge permit
- coastal permit.

Part 3 of the RMA spells out the duties and restrictions under the Act. In most cases, the use of a resource is prohibited unless expressly allowed by a rule in a plan. The main exception is land use, which is permitted **unless** it contravenes a rule in a district plan. In this instance, a resource consent may be necessary for land use.

Under the RMA, district and regional plans must spell out when activities may require a resource consent and the type and category of consent that is necessary.

Applications of national significance

The Minister for the Environment has a power to "call in" a local proposal deemed to be of national significance. The decision then becomes the responsibility of the Minister for the Environment. The Minister decides whether a proposal is of national significance. Some of the criteria that can be considered are whether a

proposal:

- has aroused public concern or interest
- involves significant use of natural and physical resources or technology new to New Zealand which may affect the environment
- affects a nationally significant feature or area, or more than one region, or New Zealand's international obligations to the global environment
- is significant in terms of the principles of the Treaty of Waitangi.

Environment Act

The Environment Act 1986 established the Ministry for the Environment and the Office of the Parliamentary Commissioner for the Environment. The Commissioner is an officer of Parliament appointed for a five-year term to provide an independent check on the system of environmental management and the performance of public authorities on environmental matters.

The functions of the Ministry for the Environment, as set out in the Environment Act 1986, are:

- to advise the Minister on all aspects of environmental administration, including:
    - policies for influencing the management of natural and physical resources and ecosystems
    - significant environmental impacts of public or private sector proposals, particularly those that are not adequately covered by legislative or other environmental assessment requirements currently in force
    - ways of ensuring that effective provision is made for public participation in environmental planning and policy formulation processes in order to assist decision-making
- to obtain information, and to conduct and supervise research on environmental policies
- to provide Government, its agencies and other public authorities with advice on:
    - the application, operation, and effectiveness of the Acts specified in the Schedule to the Environment Act in relation to ensuring that, in the management of natural and physical resources, full and balanced account is taken of (i) the intrinsic values of ecosystems; (ii) all values which are placed by individuals and groups on the quality of the environment; (iii) the principles of the Treaty of Waitangi; (iv) the

sustainability of natural and physical resources; and (v) the needs of future generations
    - procedures for the assessment and monitoring of environmental impacts
    - pollution control and the coordination of the management of pollutants in the environment
    - the identification and likelihood of natural hazards and the reduction of the effects of natural hazards
    - the control of hazardous substances, including the management of the manufacture, storage, transport, and disposal of hazardous substances
- to facilitate and encourage the resolution of conflict in relation to policies and proposals which may affect the environment
- to provide and disseminate information and services to promote environmental policies, including environmental education and mechanisms for promoting effective public participation in environmental planning
- generally to provide advice on matters relating to the environment.

Agricultural Compounds and Veterinary Medicines Act

This legislation is not yet in force. It will replace the Stock Foods Act 1946, Animal Remedies Act 1967 and Fertilisers Acts 1960 and 1982.

The ACVM Act will regulate the agricultural compounds and veterinary medicines used in farming and the treatment of animals and plants, and is a companion measure to the HSNO Act. Together with the HSNO Act and the Pesticides Act 1979, it will regulate all substances applied to or used in association with animals and plants in New Zealand. The date of implementation of the ACVM Act and of the hazardous substances part of the HSNO Act has yet to be advised.

Under the new legislation, the Director-General of Agriculture and Forestry is responsible for administering the ACVM Act with the Animal Remedies and Pesticides Boards being dissolved at the completion of the transition process to the ACVM and HSNO Acts.

Medicines Act

The Medicines Act 1981 and the Medicines Regulations 1984 provide a framework for the approval of medical products. The Act and the regulations control the classification, standards, labelling and use of prescription or restricted medicines. (Dietary supplements are regulated under the Food Act 1981.)

Medicines are assessed for safety and efficacy by the Medicines Assessment Advisory Committee (MAAC) using international guidelines. Medsafe (a business unit of the Ministry of Health) supports MAAC. On MAAC's recommendation, the Minister of Health approves medical products for distribution. The Medicines Classification Committee classifies medicines according to categories such as 'prescription only' and 'restricted'.

Under the Medicines Act, clinical trials of new medicines cannot be undertaken before approval has been obtained from the Director-General of Health, who must seek the recommendation of the Health Research Council (HRC) about the proposed trial. When the trial involves gene therapy or xenotransplantation, the HRC refers the issue to its Genetic Technology Advisory Committee (GTAC), an expert technical committee which was established in 1995.

When the new medicine is a recombinant medicine or a genetically modified organism, the proposed trial would be referred to the HRC's Standing Committee on Therapeutic Trials (the SCOTT committee), as are all other trials of new medicines. If the new medicine is, or contains, a live genetically modified organism, the sponsor of the proposed trial would be advised to contact ERMA and seek the necessary approvals.

Australian and New Zealand Health Ministers are considering a single joint trans-Tasman agency to replace Medsafe in New Zealand and the Therapeutic Goods Administration (TGA) in Australia. The joint agency would be responsible for regulating therapeutic goods and healthcare products in Australia and New Zealand. Its broad range of functions would be substantially equivalent to the range of functions currently performed by the TGA and Medsafe, including:

- evaluation of medicines and medical devices
- standard setting
- compliance monitoring
- enforcement activities.

In the present system, approval of medical products in New Zealand involves a case-by-case consideration of the quality, safety and efficacy of a medical product. There is currently no requirement to label or distinguish recombinant medicines. Pharmaceutical companies follow a general practice of disclosing genetically modified components or technology. This is an entirely voluntary system of disclosure.

The Ministry of Health reports an increasing trend in the development of live genetically modified organism vaccines. Such medicines will need approval under the Medicines Act and the HSNO Act. (The application fee for Medsafe approval

is $15,300 and a mid-range fee for approval from ERMA for a genetically modified organism medicine is estimated at around $48,000.)

Except to the extent that it affects the quality, safety or efficacy of that product, the genetic modification status of a medicine is not used as a criterion for accepting or rejecting a product in New Zealand. Currently about 20–30 recombinant protein medical products have been approved for use in New Zealand and comparable countries.

Other agencies involved in the purchase and use of medicines include:

- Pharmac (Pharmaceutical Management Agency), which manages the Pharmaceutical Schedule of the Health Funding Authority, setting the purchase, pricing, subsidies and conditions of prescription of approximately 3000 prescription drugs and products, with the assistance of the following agencies
- Pharmacology and Therapeutics Advisory Committee
- National Advisory Committee on Health and Disability, which provides independent advice to the Minister of Health on health services and products, including the therapeutic uses of genetically modified products and therapies.

Food Act and regulation

Food is regulated under the Food Act 1981 and statutory regulations. Genetically modified food is regulated jointly by New Zealand and Australia. Currently, food regulation is in a transition period to this joint position.

The Agreement between the Government of New Zealand and the Government of Australia Establishing a System for the Development of Joint Food Standards ('the Joint Food Treaty'), signed in December 1995, came into force on 4 July 1996. The Treaty implements a single set of standards for the composition and labelling of food in both countries. These standards make up the Australia New Zealand Food Standards (the 'Joint Code'), which was approved and gazetted at the end of 2000. There is a transitional period of two years before the Joint Code becomes the sole food standard for New Zealand. During this time, food businesses may comply with either the New Zealand Food Regulations 1984, the Australian Food Standard Code (incorporated into New Zealand law under the New Zealand Food Standard 1996) or the Joint Code.

Standard A18: *Food Produced Using Gene Technology*, is incorporated into New Zealand law as a mandatory standard in the New Zealand Food Standard 1996, which must be complied with irrespective of the regime followed during the transitional period.

Genetically modified foods may not be sold unless specifically listed in A18. Such listing requires ANZFSC (the Australia New Zealand Food Standards Council) approval, on the advice of ANZFA (the Australia New Zealand Food Authority). Currently the following GM foods have been listed in the Standard:

- oil derived from glyphosate-tolerant canola line GT73
- food derived from glyphosate-tolerant corn line GA21
- food derived from insect-protected corn line MON 810
- oil and linters derived from glyphosate-tolerant cotton line 1445
- oil and linters derived from insect-protected cotton lines 531, 757 and 1076
- food derived from glyphosate-tolerant soybean line 40-3-2
- food derived from high oleic acid soybean lines G94-1, G94-19 and G168.

The approval process

ANZFA is responsible for developing food standards that ensure the safety of food. The Authority has adopted guidelines for the safety assessment of foods produced using gene technology. These guidelines are based on protocols and principles developed by the World Health Organization (WHO), Food and Agriculture Organization (FAO) and Codex Alimentarius Commission.

The safety assessments carried out by ANZFA are to determine that the food is as safe as its conventional counterpart. Using the guidelines and information supplied by the food biotechnology companies, food toxicologists, molecular geneticists, biologists and nutritionists assess the characteristics of the genetically modified commodities used in foods to determine if the foods have been changed in any way that would make them unsafe.

The ANZFA expert team examines individual applications, carries out a preliminary data assessment and then seeks public submissions. At this point, the application is rejected if it fails to meet these general requirements.

Subject to the response, a full safety assessment is conducted. The scientific team then assesses the characteristics of genetically modified commodity to determine if they have been changed in any unsafe way. A genetically modified food commodity is considered to be safe if all the characteristics (chemical, physical, nutritional and use) are the same as its conventional counterpart. A preliminary recommendation is made before a second round of public comment is sought. Finally, ANZFA makes a recommendation to Health Ministers, meeting as ANZFSC, for approval.

Australia New Zealand Food Authority Act (Commonwealth)

The Australia New Zealand Food Authority Act 1991 is a federal Australian statute which established the Australia New Zealand Food Standards Council and the

Australia New Zealand Food Authority. ANZFA is an independent, binational, statutory authority charged with developing and maintaining the laws and regulations pertaining to food in New Zealand and Australia as described above.

Animal Products Act

The Animal Products Act 1999 regulates the production and processing of animal material and products in New Zealand.

The Act's purpose is to protect human and animal health, and facilitate overseas market access. The Act defines a hazard as a biological, chemical or physical agent that is in (or has the potential to be in) animal material or product, or is (or has the potential to be) a condition of animal material or product, and leads (or could lead) to an adverse health effect on humans or animals.

The Act requires animal or animal product processing to be carried out under registered risk management programmes. Where it is inappropriate or impracticable to manage risks under these programmes, or special provision is required for the purposes of overseas market access requirements, MAF may impose regulated control schemes.

Health Act

The Health Act 1956 is the main legislation under which the Ministry of Health's principal role of improving, promoting and protecting public health (eg, notification of infectious diseases, quarantine) is established. The Act establishes public health officials, such as regional medical officers of health, who have wide and autonomous powers to act for public health.

The Act also regulates the collection, storage and uses of personal health information by health and disability service providers or funders (eg, health statistics and other related information).

The **New Zealand Public Health and Disability Act 2000** replaces the Health and Disability Services Act 1993. In general terms, the Act relates to, and reorganises, the public health and disability sector.

The Minister of Health's responsibilities under the Act include:

- determining health and disability strategies
- negotiating and entering into agreements under which the Crown provides money in return for the provision of health or disability support services
- establishing and appointing committees, including (among others) a national advisory committee on health and disability support services ethics.

District Health Boards (DHBs) are established, and take over functions of the former Hospital and Health Services (HHSs), which are dissolved.

Inquiry boards may be appointed by the Minister of Health to conduct an inquiry into, and report to the Minister on, matters such as the funding or provision of health services or disability support services, or the management of any publicly owned health and disability organisation.

The former Health Funding Authority (HFA) is dissolved, and its functions, transferred to the Crown, acting through the Ministry of Health. However, funding of the provision of health services or disability support services may be further devolved under the Act.

The **Health and Disability Commissioner Act 1994** establishes the independent statutory office of the Health and Disablity Commissioner for mediation and investigation of complaints against health and disability services providers. The Health and Disability Commissioner (Consumers Rights) Regulations are enacted pursuant under this Act.

Legislation and regulation potentially applicable to genetic modification

Animal Welfare Act

MAF has responsibility under the Animal Welfare Act 1999 for developing and promulgating standards of animal welfare; ensuring all complaints of cruelty are investigated; resolving objectively existing and potential animal welfare problems; identifying animal welfare research priorities; and liaising with New Zealand and international agencies involved in animal welfare policy formulation.

Two ministerial advisory committees play a key role in the development of animal welfare policy and standards, by way of a transparent and fully consultative process. These are the National Animal Welfare Advisory Committee (NAWAC) and the National Animal Ethics Advisory Committee (NAEAC).

Animals Protection (Codes of Ethical Conduct) Regulations

The Animals Protection (Codes of Ethical Conduct) Regulations 1987 relate to and provide for the observance of codes of ethical conduct relating to the welfare and humane treatment of live animals that are manipulated in any research, experimental, diagnostic, toxicity or potency testing work or are used in teaching involving the manipulation of live animals.

Conservation legislation

The Department of Conservation has responsibilities and powers under several Acts that provide for the management for conservation purposes of land and historic places and artifacts, native plants and animals, native and introduced species for recreational purposes, and the promotion of, and education about, conservation. These include:

- Conservation Act 1987
- Wildlife Act 1953
- Wild Animal Control Act 1977
- National Parks Act 1980
- Reserves Act 1977.

Intellectual property legislation

Legislation potentially applicable to genetic modification issues of intellectual property protection include:

- Patents Act 1953
- Plant Variety Rights Act 1987.

Consumer protection legislation

Two Acts relating to consumer protection have potential application to issues of genetic modification:

- Fair Trading Act 1986 involves consumer information and liability for false or misleading representations, together with products and services safety. The Minister for Consumer Affairs has power to impose regulations setting safety standards for products and services and labelling requirements for products.
- Consumer Guarantees Act 1993 covers statutory guarantees and consequent liability for goods and services as "fit for purpose".

Table 2.1 provides a schematic representation of the regulations, national and international agencies and agreements, and the relevant government organisations discussed above.

Research

There is no specific legislation or regulation that controls the research into genetic modification or biotechnology in general although, as noted, the HSNO Act controls the development and importation of genetically modified organisms.

Policy advice, which includes advice on priorities for science and technology research, comes from the Ministry of Research, Science and Technology. Currently there is no specific government policy on research into using genetic modification technologies.

Purchasers of research on behalf of Government include:

- The Health Research Council, set up under the Health Research Council Act 1990, funds research on health and medical projects. (See box "Health research projects".)

Health research projects

The following regulations, guidelines and papers have been adopted by the HRC as applicable to research projects it funds:

HRC Guidelines for Ethics Committee Accreditation, Health Research Council of New Zealand, 1996

Report and Guidelines on the Clinical and Research Use of Human Genes, Health Research Council of New Zealand, 1995

Guidelines for Institutional Animal Ethics Committees, National Animal Ethics Advisory Committee, Ministry of Agriculture, 1988

Revised New Zealand Guidelines for Genetic Manipulation Research, Advisory Committee on Novel Genetic Techniques, Ministry for Environment, 1982; and Amendment, 1988

National Standard for Ethics Committees, Ministry of Health/HRC, July 1996

Good Clinical Research Practice Guidelines, Ministry of Health, 1996

The Health and Disability Commissioner (Code of Health and Disability Services Consumers' Rights) Regulations 1996

International guidelines and regulations

Clinical Trials, Supplementary Note 3, NH&MRC Canberra Statement on Human Experimentation, 1988

Declaration of Helsinki, adopted by the 18th World Medical Association, Helsinki, Finland 1964, and revised in 1989 by the World Medical Association

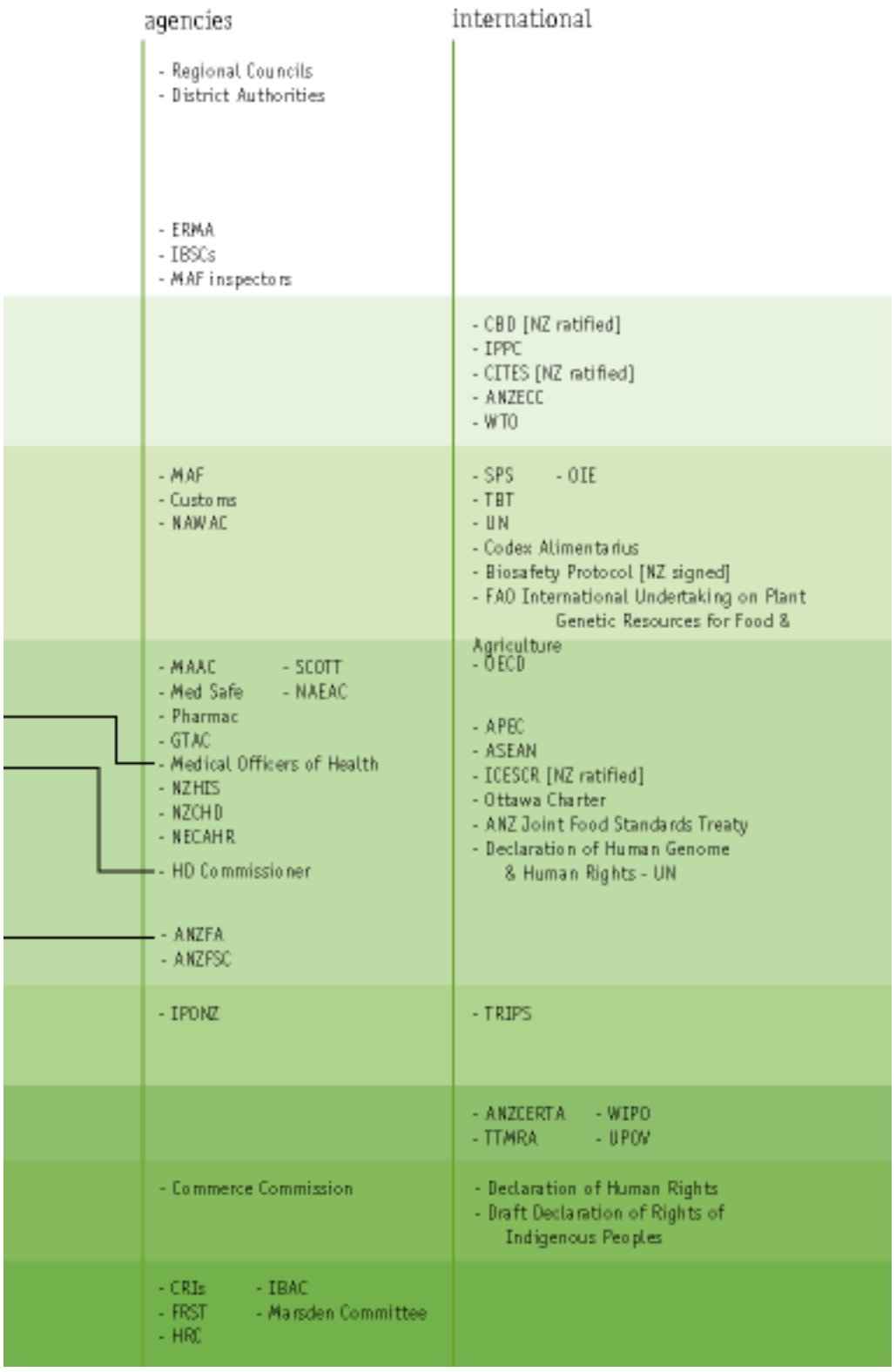
International Ethical Guidelines for Biomedical Research Involving Human Subjects, Council for International Organisations of Medical Sciences (CIOMS), 1993

Research Involving Patients, a report of the Royal College of Physicians, 1990

Table 2.1 Regulations, agencies and agreements relevant to New Zealand's

government	legislation	regulations
PCE	Environment Act 1986 Resource Management Act 1991	- National Environmental standards - National policy statements - Coastal policy statement - Regional policy statement - Regional Plans - District Plans
MFE	HSNO Act 1991	- applications - methodology - GMO def/exemption
DOC	Conservation Act 1987 Wildlife Act Wild Animals Control Act Reserves Act National Parks Act	- Pest control - Pest eradication - Native species protection
MAF	Biosecurity Act 1993 ACVM Act 1997 Animal Products Act 1999 Animal Welfare Act 1999	- Biosecurity regulations - Animal remedies regulations - Stock foods regulations - Animal Protection (codes of ethical conduct) - Animal Products regulations
MOH	Medicines Act 1981	- Medicines regulations - Consents for medicines/medical devices
	Health Act 1956	
	Health & Disability Commissioner Act Health & Disability Services Act 1993	- HDC (Consumer Rights)
	Food Act 1981 ANZFA Act 1991 (Aust.)	- Food - Food hygiene - Dietry supplements - Food standards [A18] - ANZ Joint Food Code [draft]
MED	Patents Act 1953 Plant Variety Rights Act 1987 Trade Marks Act	
MFAT		
MCA	Fair Trading Act 1986 Consumer Guarantees Act 1993	- Product Safety Standards - Consumer Information Standards
MORST	Crown Research Institutes Act Health Research Council Act FRST Act 1990	

inquiry into genetic modification.



- The Foundation for Research, Science and Technology (FRST), established and acting under the Foundation for Research, Science, and Technology Act 1990, funds social, economic and environmental research.
- The Marsden Fund is administered by the Marsden Fund Committee of the Royal Society of New Zealand. This fund is for "blue skies" research that contributes to the knowledge and skill base of research in New Zealand. There are no specific targets or priorities for this research fund.

Research providers include:

- nine Crown Research Institutes, established under the Crown Research Institutes Act 1992
- other public research institutes
- private research institutes.
- universities
- government departments and agencies
- private companies.

If research is into genetic modification or using genetic modification technology, it must comply with the HSNO Act and other regulatory controls, such as the Animal Welfare Act, Biosecurity Act and so on.

Proposed legislation that may affect genetic modification

Assisted Human Reproduction Bill

This Bill was introduced to Parliament on 19 February 1999. It is due to be reported back from Health Select Committee to the House on 21 June 2001. The Bill makes it an offence to clone humans, fuse animal and human gametes, implant animal or human embryos into the opposite species and use human cells to develop procedures or techniques to carry out any of these activities. The Bill also prohibits the sale of human gametes or embryos. It provides for the appointment and functions of the National Ethics Committee on Assisted Human Reproduction, which is responsible for developing guidelines and protocols in this area.

Human Assisted Reproductive Technology Bill

The purpose of the Bill is to formulate a legal framework for restrictions and controls on assisted reproductive technology, associated research and surrogacy and other practices, keeping such regulation in line with that of Australia, Canada and Britain, in particular.

2.

appendix 1

Context and process

Section contents

2.2 Genetic modification and the precautionary approach

Introduction

The precautionary principle is based on the concept of taking anticipatory action to prevent possible harm under circumstances where there is a level of scientific uncertainty. However, there is much discussion and diversity of opinion as to defining and applying the principle. Because application of the principle is particularly important in issues of genetic modification, this section outlines the development of the principle and gives examples of differing interpretations of the principle in international usage, including its application in New Zealand.

The precautionary principle emerged in European environmental movements and began to be incorporated in legislation and other agreements in the 1970s, reflecting a growing concern about the ability of scientific risk assessment and management models to accurately predict the adverse effects of new and complex technologies. It has been said that its roots are in the 1930s German concept of Vorsorgeprinzip ("foresight planning") used to distinguish between the dangers and the risks caused by human behaviour. Two different approaches were required: to prevent dangers on the one hand; but, where there was only a risk of effects occurring, to investigate risk prevention and, if warranted, apply preventative measures (Coates 2000).

Because the precautionary principle has evolved over time and in a number of places for different purposes, there is no one generally agreed definition, nor is there any uniform interpretation of the principle.

Current status in the international context

The precautionary principle is one of the basic premises of international environmental law. It currently appears in over 20 international treaties, laws, protocols, and declarations (Table 2.2 gives a range of examples).

It has been considered by the International Court of Justice (eg, New Zealand's case against France on nuclear tests in the Pacific).

Table 2.2 International statements of the precautionary principle

Statements from Conventions

1 *London Convention 1972* (Resolution LDC. 44/14, 1991):

AGREES that in implementing the London Dumping Convention the Contracting Parties shall be guided by a precautionary approach to environmental protection whereby appropriate preventive measures are taken when there is reason to believe that substances or energy introduced in the marine environment are likely to cause harm even when there is no conclusive evidence to prove a causal relation between inputs and their effects;

AGREES FURTHER that Contracting Parties shall take all necessary steps to ensure the effective implementation of the precautionary approach to environmental protection and to this end they shall:

(a) encourage prevention of pollution at the source, by the application of clean production methods, including raw materials selection, product substitution and clean production technologies and processes and waste minimization throughout society;

(b) evaluate the environmental and economic consequences of alternative methods of waste management, including long-term consequences;

(c) encourage and use as fully as possible scientific and socio-economic research in order to achieve an improved understanding on which to base long-range policy options;

(d) endeavour to reduce risk and scientific uncertainty relating to proposed disposal operations; and

(e) continue to take measures to ensure that potential adverse impacts of any dumping are minimized, and that adequate monitoring is provided for early detection and mitigation of these impacts ...

2 *UN Framework Convention on Climate Change* (Article 3(3), 1992):

The Parties should take precautionary measures to anticipate, prevent or minimise the causes of climate change and mitigate its adverse effects. Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing such measures, taking into account that policies and measures to deal with climate change should be cost effective so as to ensure global benefits at the lowest possible cost ...

continued

Table 2.2 continued

3 *Convention on the Protection of the Marine Environment of the Baltic Sea Area* (Article 3(2),1992)

The Contracting Parties shall apply the precautionary principle, i.e., to take preventative measures when there is reason to assume that substances or energy introduced, directly or indirectly, into the marine environment may create hazards to human health, harm living resources and marine ecosystems, damage amenities or interfere with other legitimate uses of the sea even when there is no conclusive evidence of a causal relationship between inputs and their alleged effects.

4 *Convention for the Protection of the Marine Environment of the North-East Atlantic* (Article 2(2)(a),1992)

The Contracting Parties shall apply:

(a) The precautionary principle, by virtue of which preventive measures are to be taken when there are reasonable grounds for concern that substances or energy introduced, directly or indirectly, into the marine environment may bring about hazards to human health, harm living resources and marine ecosystems, damage amenities or interfere with other legitimate uses of the sea, even when there is no conclusive evidence of a causal relationship between the inputs and the effects...

5 *Treaty on European Union* (Article 130r(2), 1992)

Community policy on the environment shall aim at a high level of protection taking into account the diversity of situations in the various regions of the Community. It shall be based on the precautionary principle and on the principles that preventive action should be taken, that environmental damage should as a priority be rectified at source and that the polluter should pay. Environmental protection requirements must be integrated into the definition and implementation of other Community policies.

Non-treaty statements

1 *Declaration of the Second North Sea Conference* (Paragraphs VII and XVI.1,1987)

Accepting that, in order to protect the North Sea from possible damaging effects of the most dangerous substances, a precautionary approach is necessary which may require action to control inputs of such substances even before a causal link has been established by absolutely clear scientific evidence...

[The participants] accept the principle of safeguarding the marine ecosystem of the North Sea by reducing polluting emissions of substances that are persistent, toxic and liable to bioaccumulate at source, by the use of the best available technology and other appropriate measures. This applies especially when there is reason to assume that certain damage or harmful effects on the living resources of the sea are likely to be caused by such substances, even where there is no scientific evidence to prove a causal link between emissions and effects ("the principle of precautionary action")...

2 *UNEP Governing Council Recommendation* (12th Meeting, May 25, 1989)

Recognizing that waiting for scientific proof regarding the impact of pollutants discharged into the marine environment may result in irreversible damage to the marine environment and in human suffering.

Also aware that policies allowing uncontrolled discharges of pollutants continue to pose unknown risks...

The UNEP Governing Council ecommended that all Governments adopt the 'principle of precautionary action' as the basis of their policy with regard to the prevention and elimination of marine pollution.

3 *Bergen Declaration* (Paragraph 7, 1990)

In order to achieve sustainable development, policies must be based on the precautionary principle. Environmental measures must anticipate, prevent and attack the causes of environmental degradation. Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.

4 *Declaration of the Third International Conference on the Protection of the North Sea* (Preamble, 1990)

[The participants] will continue to apply the precautionary principle, that is to take action to avoid potentially damaging impacts of substances that are persistent, toxic and liable to bioaccumulate even where there is no scientific evidence to prove a causal link between emissions and effects.

continued

Table 2.2 continued

5 *Agenda 21* (Oceans Chapter 17, Paragraph 17.21, 1992)

A precautionary and anticipatory rather than a reactive approach is necessary to prevent the degradation of the marine environment. This requires, inter alia, the adoption of precautionary measures, environmental impact assessments, clean production techniques, recycling, waste audits and minimization, construction and/or improvement of sewage treatment facilities, quality management criteria for the proper handling or hazardous substances, and a comprehensive approach to damaging impacts from air, land and water. Any management framework must include the improvement of coastal human settlements and the integrated management and development of coastal areas.

When an activity raises threats of harm to human health or the environment, precautionary measures should be taken even if the cause and effect relationship are not fully established scientifically.

Most notably the precautionary principle has been specifically incorporated in Principle 15 of the 1992 United Nations Conference on Environment and Development (The Rio Declaration) which states that:

> where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation

Article 11.8 of the Cartagena Protocol on Biosafety (January 2000) states:

> Lack of scientific certainty due to insufficient relevant scientific information and knowledge regarding the extent of the potential adverse effects of a living modified organism on the conservation and sustainable use of biological diversity in the Party of import, taking also into account risks to human health, shall not prevent that Party from taking a decision, as appropriate, with regard to the import of that living modified organism intended for direct use as food or feed, or for processing, in order to avoid or minimize such potential adverse effects.

However, because the Protocol provides that risk assessments are carried out in a scientifically sound and transparent manner, the exact impact of the Protocol remains unclear. This reflects a central unresolved issue in national and international invocations of the principle, namely, the issue of what level of scientific evidence of potential harm is required to trigger the application of precaution.

The Rio and Cartagena formulations are widely cited as definitive statements of the precautionary principle by both supporters and critics.

New Zealand use of the principle

New Zealand is a party to the multilateral environmental agreement, the Rio Declaration on Environment and Development, which was one of the achievements of the 1992 UN Conference on the Environment and Development (UNCED or the 'Earth Summit').

The Declaration has 27 guiding principles for sustainable development, including the precautionary approach which states that lack of full scientific certainty of the causes or effects of environmental damage should not be a reason for delaying action to prevent such damage. Such a principle is not legally binding but parties to the Declaration agree to respect it when considering a particular environmental issue. New Zealand's environmental legislation is considered to be largely in accord with the themes of Agenda 21, the plan to implement the Rio Declaration principles, and the challenge is their satisfactory application here.

The precautionary principle has been included in the key legislation governing genetic modification in New Zealand. Section 7 of the Hazardous Substances and New Organisms Act 1996 describes the "precautionary approach" as involving:

> the need for caution in managing adverse effects where there is scientific and technical uncertainty about those effects

In July 1995, Government also adopted the precautionary approach as one of the guiding principles in the Environment 2010 Strategy for integration of environment, society, and the economy.

At another level, the joint standard on Risk Management published by Standards New Zealand and Standards Australia (AS/NZS 4360) and the associated *Handbook 203-2000: Environmental Risk Management — Principles and Process* note that adoption of the principle or a precautionary approach is one way of addressing the inherent uncertainty and ignorance associated with environmental decisions. Organisations have to take decisions, but in some cases the decision-maker must explicitly recognise that unknown factors exist.

Elements of the principle at issue

Generally, the core elements or directions underlying the precautionary principle, and also the main areas of debate, are:

- recognition of scientific uncertainty and fallibility
- presumption in favour of health and environment proaction (ie, a willingness to take action in advance of formal scientific proof)
- a shift in the onus of proof and standards of evidence to those who propose change (ie, the users of the technology must prove with low margins of error that it is safe, rather than challengers of the technology having to prove unacceptable risk to the same standard of proof)
- standards of acceptable risk (safety)
- providing ecological margins of error
- cost-effectiveness of action or inaction (ie, some consideration of proportionality of costs associated with the use or non-use of the technology; thus, the more catastrophic the potential effect, the more presumption in favour of precaution despite its costs)
- intrinsic value of non-human entities
- concern for future generations
- paying for ecological damage through strict/absolute liability regimes.

The common criticisms of the precautionary principle include:

- The precautionary principle lacks a uniform interpretation. One study found 14 different interpretations of the principle (Foster et al, 2000). Some treaties, such as that of the European Union, refer to the principle but do not define it. Other international instruments, such as the Cartagena Protocol, adopt it in an ambiguous manner.
- The precautionary principle marginalises the role of scientists and can be applied in an arbitrary fashion. This criticism is based upon the concern that the invocation of the principle usually involves the relaxation of the standards of proof normally required by the scientific community. In the face of evidence less rigorous than that required for "science-based" conclusions, decision-making then invokes other, extra-scientific considerations.
- The precautionary principle is used as a veiled form of trade protectionism. The essence of this criticism is that the principle is used to circumvent the fundamental rules established by trade agreements enforced by the World Trade Organization, which generally require a showing by an importing country of reliable scientific evidence that an exported product poses levels of risk not accepted in domestic products (eg, the Agreement on the Application of Sanitary and Phytosanitary Measures). The precautionary principle undermines the force of this requirement by releasing the importing country from the onus of proof and/or relaxing the rigour of the scientific evidence required to allege unacceptable risk.
- The use of the precautionary principle is a form of over-regulation that will lead to a loss of potential benefits (such as increases in agricultural productivity).

References and further information

Publications

Coates D. 2000. The Precautionary Principle — "Nothing ventured, nothing gained"? *Avcare Insights* 1: 2.

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appendix 1

Context and process

Section contents

2.3 Genetic modification technology and its use in New Zealand

Introduction

Fundamental to genetic modification is deoxyribonucleic acid (DNA). DNA provides the information by which cells know what to do, what to be, and how.

DNA is found in cells, specifically in the nucleus, where it is found in giant complexes called chromosomes. DNA is a long strand of joined molecules called nucleotide bases, of which there are four: adenine, cytosine, thymine and guanine. Two strands of nucleotide bases are usually bound together (adenine bonding with thymine, cytosine with guanine) to form the famous double helix.

The sequence of bases is important because it provides the code for proteins (including enzymes) or, in some instances, ribonucleic acid (RNA). (RNA is a single strand of the nucleotide bases found in DNA, except that uracil substitutes for thymine. RNA differs from DNA in that the sugar ribose, and not deoxyribose, forms part of its structure.) To produce a protein, the part of the DNA which codes for it, the gene, is used as a template to make a strand of RNA. The RNA moves out of the nucleus into the cytoplasm of the cell where it is used to bring protein 'building blocks' (molecules called amino acids) together in the correct order, according to the code, to construct the protein. Therefore it can be said that genes are expressed as proteins.

Genetic modification is the manipulation of the DNA of an organism by adding or subtracting bases in the DNA sequence, or by adding or subtracting entire genes to or from the sequence. A variety of procedures allow this kind of manipulation. This section provides a basic introduction to some of these procedures and their applications in New Zealand. The use of genetic modification and its technologies in New Zealand is, however, widespread and diverse, and the examples below are by no means exhaustive.

Many of these examples are drawn from information provided to the Commission by Interested Persons in their submissions and witness briefs. These are referenced by the 'IP' number assigned to each of the submitters. (Full details of the

Interested Persons nomenclature is available in Table 1, Appendix 2.) A name follows the number when the information is drawn from a witness brief. The Interested Persons referenced in this section are listed by IP number in the "References and further information". All the submissions and witness briefs are publicly available on the Commission website (http://www.gmcommission.govt.nz) until 30 June 2002.

A glossary of technical terms forms part of the "Glossaries" section later in this volume.

Basic techniques of genetic modification technology

Genetic modification technology employs several major techniques, which can be used alone or in combination:

- DNA fragmentation
- recombination
- transformation
- selection
- cloning
- DNA libraries
- identification
- sequencing
- restriction mapping
- insertional mutagenesis
- DNA injection
- knockout technology and homologous recombination.

Much of the following description of the techniques is based on that provided by Strickberger (1985). Other descriptions are drawn from NHGRI Glossary of Genetic Terms and Interested Persons ([IP59] Morris, [IP13] Woodfield). Descriptions of knockout technology and homologous recombination are derived from websites listed at the end of this section (see "References and additional information").

DNA fragmentation

Fragmentation of DNA allows technologists to work with the genes of an organism more easily than if the genes were in their natural state. Usually, only a

few genes or sequences of a genome are of interest or able to be dealt with. It is therefore necessary to fragment DNA that contains these genes. DNA fragments are created either by exposing the genome to enzymes (often restriction enzymes) that cut the DNA at known base sequences, or by various mechanical shearing techniques. The resultant fragments will be of different lengths and sequences, and may or may not contain the gene(s) of interest. Further manipulation is required to isolate the target sequences.

Recombination

The process of recombination involves bringing DNA from different sources together. Usually the sources of the DNA are the fragments, some of which may contain the genes of interest, and vector DNA, which allows the transportation of the gene of interest into a host. This is usually done for one of two reasons:

- replication of the recombinant DNA to provide many copies of the gene, or
- translation of the gene into its product (ie, a protein).

This process is often done using plasmids. (A plasmid is a circular DNA molecule, not associated with a chromosome, which can replicate autonomously.) Plasmids are particularly common in bacteria and are often associated with antibiotic resistance.

To create recombinant DNA, a specific plasmid is selected and copies of it are cut at a specific site, frequently also with a restriction enzyme. This produces an opening in the plasmid ring. The open plasmids are mixed with the DNA fragments created earlier, and enzymes that allow DNA to rejoin. This technique produces plasmids that may have a foreign fragment of DNA inserted into them. (There will also be plasmids that have no inserted DNA.) Of the plasmids that contain one of the foreign DNA fragments, only some will contain the DNA of interest.

There are numerous variations on this method of forming recombinant DNA, using a variety of enzymes. The basics of the process are similar.

Transformation

The recombinant plasmids need to be inserted into a cell for the genes they contain to be expressed. A common way of transforming cells with (recombinant) plasmid DNA is by using chemicals to make the host cell walls (plant, animal or bacterial cells) permeable to the plasmid, allowing the plasmids to enter.

Bacteriophages (viruses that are parasitic in bacteria; also known as phages) may also be used as vectors ('carriers'). Foreign genetic material can be incorporated

into their DNA so that they may transfer this genetic material to a bacterial cell. Using phages, rather than plasmids, allows longer DNA fragments to be manipulated. Once inserted into the phage, these foreign DNA fragments remain more stable than they do in plasmids. Bacteriophages also enter cells more easily than plasmids.

Selection

No matter which of these transformation techniques is used, the frequency of transformation is low. Transformation results in a mixture of cells, some of which will have been transformed with the DNA of interest, some with other DNA fragments and some will not have been transformed at all. Therefore it is necessary to be able to distinguish between these types. This is usually done by ensuring that the plasmid-transformed host cells express a particular, known phenotype (or observable characteristic), and that those that contain the correct DNA fragment express a second known phenotype, which can then be tested for. These phenotypes are commonly, but not exclusively, antibiotic resistance. The genes for these phenotypes are thus 'markers'.

Cloning

Once a host cell, say bacterial, has been identified as containing the gene of interest, it can be grown to produce many bacterial cells. All the bacteria grown will have the same recombinant plasmid; they are called clones. By cloning the bacteria, enough of the gene fragment can be produced so that the gene of interest may be isolated and identified.

Vectors, especially plasmids, can be created so that the foreign DNA can be transcribed and translated (ie, turned into the protein(s) for which it codes) inside the host cell. Cloning enables a large amount of the gene product to be created. This is used when the gene(s) of interest produce a useful compound.

A different cloning technique can be used to produce many copies of a piece of DNA. If a particular, known DNA sequence is desired, the RNA copy of the sequence (mRNA) can be isolated from the cell, and exposed to an enzyme called "reverse transcriptase" which produces DNA copies of the mRNA.

DNA libraries

Gene libraries are used to provide a source of clones of a particular whole genome. To this end an entire genome is fragmented, the phage vectors prepared and recombined with the DNA fragments. An appropriate bacterial strain (often *Escherichia coli*) is infected with the phages so that a stock of cells carrying the entire assemblage of foreign DNA fragments is maintained.

In this way the genome is cloned into hundreds of thousands of phage particles. The result provides a library of random DNA fragments from which particular clones can be selected and identified.

Identification

There are various, related techniques for identifying clones that contain DNA of interest. Radioactively or fluorescently labelled probes (single strands of DNA whose sequence is known) are allowed to mix with a variety of clones whose DNA has been denatured (changed to a single-stranded state). Those with a base sequence complementary to the probe will bind with it and can be recognised by their radioactivity or fluorescent nature. These can then be further cloned, until sufficient amounts of DNA have been produced for further study.

Sequencing

Sequencing is the process by which the order of the nucleotide bases on a strand of DNA can be determined. To do this, copies of the unknown sequence (taken from clones) are radioactively labelled at one end. They can then be broken down using four chemical treatments which remove one or two specified bases. This results in fragments of different sizes containing known numbers of bases, starting with one which was originally labelled. Using logic, the sequence of the bases can be determined.

Since these techniques were first developed, more specific, non-radioactive labelling procedures have been discovered. It is now possible to label or "stain" DNA fragments with any of a number of fluorescent dyes, and to visualise the chromosomal location of one or several probes simultaneously through a fluorescence microscope. Sequencing genes has thus become an automated process.

Sequencing a gene is an initial step in determining the function of genes. It is also important in the location and identification of "markers". Markers are sequences of bases or genes that occur in an identifiable location on a chromosome and enable the location of other genes that may not yet be identified.

Restriction mapping

Restriction enzymes are used to cut DNA at specific (known) sequences. This allows the DNA to be partitioned into segments that can be individually identified by their molecular weight and put into sequential order. Then, only partial digestion is allowed so that larger fragments are obtained. These are digested separately to see which segments they contain. By using overlapping information

the entire DNA molecule can be ordered onto a "restriction map". The map shows the order of the genes rather than the sequence of bases.

Insertional mutagenesis (tagging)

Insertional mutagenesis or tagging is a technique often employed to determine the function of genes in plants. Naturally occurring transposons (mobile genetic elements that can shift from one location in the genome to another) are introduced into a target plant and mobilised in the progeny of the plants. Where the transposable element inserts into a gene, the inactivation of that gene often occurs, resulting in an altered phenotype. Thus "molecular tagging" can occur. The transposon tagging can then be used in identifying and cloning a gene of interest.

DNA injection

A small volume of DNA is injected into a single-cell zygote to produce animals with additional foreign DNA. This approach has been widely used to express a gene of interest in high quantity ("over-express" a gene). It results in random or semi-random integration of the gene, usually into a single genomic site.

Knockout technology and homologous recombination

Gene knockout is the inactivation of a gene in a living organism: it is fundamental for the investigation of gene function, and uses homologous recombination techniques. Homologous recombination (or gene targeting) results in the normal gene being removed from the chromosome and replaced by the inserted one, at the same site on the chromosome. In older techniques, insertion occurred randomly in the genome.

A gene with the desired mutation is made and a selectable marker gene is attached to it. On each end of this construct, base sequences, identical to those on either side of the gene in the organism, are attached. This is then put into embryonic stem cells which have been removed from the host organism and which are grown on, artificially. In some of these cells, normal processes involving enzymes will cut both the host DNA and the inserted DNA at points in the identical base sequences and a swap between these sections will occur. This is homologous recombination and, where it has occurred, cells will express the phenotype of the marker and can be selected.

To create a knockout organism, these cells are injected into embryos which are implanted into female organisms to be born normally. Each offspring will comprise cells that are genetically altered and normal cells. Those that produce

reproductive cells with the altered gene are cross-bred to produce offspring that only have the defective gene, ie, they are knockout organisms.

How long have genetic modification techniques been used in New Zealand?

The first genetically modified organism was produced in a laboratory about 28 years ago [IP19], and genetic modification techniques have been commonplace for at least 20 years [IP77a]. In line with this figure, Environmental Resource Management Authority [IP76] reports that genetic manipulation began in New Zealand 20 years ago, and this technology has become increasingly widespread since that time.

For example AgResearch [IP13] reports using transformed *E. coli* for experimentation for the past 15 years. Institute of Molecular BioSciences (Massey University) [IP15] has also run genetic modification technology workshops for 15 years. Some genetically modified pharmaceuticals have been available in New Zealand for this length of time.

As this technology has become more commonplace worldwide and new technologies have become available, more groups in New Zealand have adopted these techniques in their programmes. Some genetic disease tests that utilise genetic modification technology have been available in New Zealand for the past six years [IP91], while Malaghan Institute of Medical Research [IP10] has been using genetically modified mice for the past five years. Landcare Research [IP12] has used genetic modification technology for the past five years, while Wrightson [IP3] reports that it has been using genetic modification techniques for only the past two years. Imported foods and feeds, which may contain genetic modification products, have been available in New Zealand over the past two or three years [IP56].

Use of genetic modification in New Zealand

The use of genetic modification techniques and products in New Zealand is widespread. Genetic modification technologies are employed by Crown Research Institutes, private companies, universities and medical institutions:

- to identify genes and their functions
- to investigate pest and disease resistance in animals and plants
- to investigate livestock fertility

- to understand, diagnose and treat human disease
- to investigate control of environmental problems
- for educational purposes.

There have been field trials of genetically modified plants and animals, and genetically modified laboratory animals (particularly mice) are often employed for research. The fundamental importance of microorganisms to this type of research means that many transformed microorganisms have been created and/or used in this country. Genetically modified products available in New Zealand mainly involve human medicines. Some imported foodstuffs may also contain genetically modified products.

Animals

Microorganisms

Microorganisms are fundamental to genetic modification technology, as vectors and for cloning DNA. Some are involved in food preparation processes, others in applications in animal, plant or human health. They will be dealt with more specifically in applications described below.

Native animal species

Scientists at such places as Landcare Research and Massey University are involved in using genetic modification technology to identify genetic variation in endangered and other native animal species. This type of research involves modifying *E. coli* strains with DNA from the species of interest to determine characteristics of the genetic sequences. In this way new species of native fish, kiwi, tuatara, skink, squid, peripatus and beetle have been identified ([IP19] Wallis). The mitochondrial genome of the kakapo has been nearly completely sequenced ([IP92] Penny) and the genetic variation of black and bush robins, sex identification of native birds, investigation of genetic diversity in tuatara, investigations into dispersal and mating systems of possums, and the production of markers for use in conservation of a wide variety of native flora has been accomplished ([IP15] Sarre).

Insects

Genetic modification of bacteria from the gut of wasps is being investigated as a means of biocontrol of wasps [IP12]. The intention is to insert a toxin gene(s) into wasp-associated bacteria such that they kill the wasps in their nests. The research has not reached the stage of producing transgenic organisms, but the isolation of possible target bacteria from wasps has been achieved ([IP13] Goldson).

Worms

Transgenic worms have been created by the addition of other worm genes, and fluorescent protein genes to research the development of possum-specific parasites [IP13].

Possums

Landcare Research [IP12] is collecting DNA from possums to identify genetic markers, and to generate enough DNA, by cloning, for DNA sequencing. Researchers are working on finding new ways to control these pests. One strategy is to control the fertility of possums. To achieve this, possum egg coat and sperm proteins have been cloned, sequenced and used to immunise female possums. This involves the creation of genetically modified bacteria and plants that express the possum proteins. Mapping of a recombinant possum protein is under way.

Stoats

There has been work into stoat biocontrol in New Zealand [IP12]. Part of this work has involved using DNA profiling to estimate stoat abundance. Massey University is investigating a vector, in the form of a gut bacterium, for the biocontrol of stoats.

Cattle

Basic work is being carried out to map and sequence the bovine genome. New Zealand Dairy Board [IP67] is hoping that this will lead to improved traditional breeding techniques, by allowing useful genetic characteristics to be identified in individuals, which can then be bred.

More specific research is also being carried out to create transgenic cattle. Two of the genetic modifications are the insertion of additional copies of two cattle milk casein genes and the disruption of an existing cattle milk protein gene. These modifications aim to alter the amount of particular proteins that already exist in milk of the cattle.

The third genetic modification involves the insertion of a synthetic copy of the human myelin basic protein gene into the cattle genome. Cattle carrying this gene secrete the protein into their milk, from which it may be purified and ultimately tested for its efficacy in the treatment of multiple sclerosis ([IP13], [IP34]).

Sheep

AgResearch [IP13] is involved with identifying naturally occurring genetic mutation in New Zealand sheep breeds and developing novel biological products (hormones, vaccines and diagnostics).

Lincoln University ([IP8] Palmer) has projects to characterise variants of a gene involved with increased lamb growth. This gene was fragmented, cloned in a

plasmid vector and used to transform *E. coli*, so that the nucleotide sequences of the different variants could be determined. This allows sheep with favourable variants of the gene to be selected for further breeding using more traditional methods.

A flock of transgenic milking sheep has been established in New Zealand. These sheep produce milk which contains human Alpha 1 Antitrypsin (hAAT), a protein that is used to combat cystic fibrosis ([IP25] Wakelin).

Myostatin, a protein that is believed to restrict muscle growth and development, is the subject of planned research in New Zealand. AgResearch [IP13] and others have determined that the myostatin gene in double-muscled Belgian Blue cattle is defective, resulting in the expression of an inactive form of the protein. In the future, development of a transgenic sheep with an inactive myostatin gene will enable research into sheep with enhanced muscle growth and development. The first stage of the work will involve introducing a synthetic antibiotic resistance gene into the myostatin locus in ovine somatic cells. The antibiotic resistance gene will be used for selecting cells that have undergone recombination. In subsequent stages, a myostatin knockout sheep will be generated by nuclear transfer and cloning technology. These procedures are now well established at AgResearch. Crossbreeding will then be carried out to generate myostatin knockout sheep ([IP13] L'Huillier).

Transgenic sheep modified with a mouse promoter gene so that they overproduce a growth factor hormone believed to increase wool production have also been investigated at Lincoln University. A DNA construct containing the growth factor gene and the promoter gene was injected into sheep embryos, which were transferred to ewes for gestation. A male offspring expressing the transgene was mated to normal ewes, producing many transgenic offspring. These were then investigated for increased wool production over several seasons ([IP8] Palmer).

There have been various genetic modification studies involved with the health of sheep flocks. For example, Lincoln University has studied an enzyme that causes a predisposition in sheep to develop cataracts ([IP8] Bickerstaffe). A modified bacterium, *Bacillus thuringiensis* (Bt), that is active against maggots in sheep flystrike has been produced ([IP13] McNatty).

In other genetic modification experimentation, Lincoln University is studying an enzyme system involved in meat tenderisation. The central portion of the genes for the enzyme system were cloned into a plasmid vector in an *E.coli* host and the sequences of the cloned fragments determined. This information was used to predict the amino acid sequence of the protein involved in the tenderisation

process. This research has indicated that tough meat is the result of low expression of the gene in muscle ([IP8] Bickerstaffe).

Sheep genotypes are also being investigated in relation to developing cures for infertility in humans ([IP13] McNatty; [IP47]).

Mice

In many areas of research, especially medical research, transgenic mice play a key role. Many of these mice are imported. AgResearch at Ruakura is the only centre in New Zealand that currently produces transgenic mice in New Zealand. These mice are either knockout mutants (ie, they have a deletion, or partial deletion, of a gene) or transgenics, which have additional gene(s) inserted into their DNA. Mice are usually modified in these ways to imitate human disease conditions, which can then be studied ([IP45] McLennan).

Animal vaccines

There are various aspects of animal disease treatment where genetic modification technology has been important. For example, a vaccine against feline leukaemia virus (FeLV) that contains a recombinant DNA-derived glycoprotein is commercially available in New Zealand ([IP28] Squires).

As part of the successful eradication of Aujeszkys Disease from New Zealand porcine livestock, the New Zealand pork industry utilised a gene deleted vaccine [IP28]. New Zealand Association of Scientists reports that there has been a hydatid vaccine developed from genetically modified *E.coli* ([IP92] Heath). 'MeganVac' is a vaccine available in New Zealand to prevent *Salmonella* outbreaks in poultry. It is produced using a gene deletion procedure to weaken the pathogen ([IP35] Diprose).

As well as simply using imported vaccines, there are underway in this country various investigations into producing novel vaccines for a range of pathogens. For example, a study into a vaccine against Johne's disease is ongoing, as is an effort to produce a vaccine against *Salmonella* Brandenburg which affects sheep in the South Island ([IP28] Squires).

More research-oriented projects involve ongoing work that will determine the ability of an organism to recognise and produce antibodies to pathogens. New Zealand whales, dolphins, seals, sea lions, black robins and leiopelmatid frogs are being investigated in this way ([IP19] Wallis).

These are only some examples of the types of work using genetic modification technology with animals in this country. Other animals, eg salmon, fireflies and blowflies, are also the subject of genetic modification investigations in New Zealand [IP85].

Plants

Plants are readily manipulated by genetic modification technologies. They can more easily be grown from a single cell than animals. Many plants of economic interest have been investigated and modified, for example forage crops, horticultural crops and forestry plants, and there is also interest in native plant species. Plants may be genetically modified to become pest-, disease- or herbicide-resistant, tolerant of a wide range of environmental conditions, or suitable for use in bioremediation or pharmaceutical production. They may also provide material for research into genetic modification techniques, plant development or gene function.

Genomics and bioinformatics in plant studies

Foundation for Research, Science and Technology (FRST) contributes funds to genomics programmes in organisations such as HortResearch, which has set up genomics projects to identify: genes and proteins involved in plant responses to pests and diseases; genes that control plant development, architecture, flowering and fruit quality characters; and genes that are involved in the plant responses to environmental stresses and signalling. It is also projected that a capability in bioinformatics to predict gene function "*in silico*" will be developed [IP5].

Genomics projects investigating the function of genes in apples and kiwifruit are currently underway at HortResearch. Using markers, genetic maps of these crops are being constructed. This kind of research has resulted in the creation of a variety of genetically modified organisms, including: bacteria to store the genes (gene libraries); transgenic bacteria and yeasts to express the protein products of the genes and determine the activity of the proteins; and transgenic plants that over-express or disrupt the expression of genes so that the function of the gene in the plant can be assessed ([IP5] Ross). HortResearch is also involved with proteomics, comparing protein data with the gene data to gain a better understanding of biological processes occurring in these crops.

Gene discovery may offer opportunities to improve crop and pasture plants. New Zealand Dairy Board is involved in sequencing ryegrass and white clover DNA [IP67] while AgResearch is actively developing sequence databases from these plants [IP13]. A key component of this work is the identification of genes expressed in different tissues at different stages of development and in response to various biotic and abiotic stresses.

New Zealand Forest Research Institute is also involved in the cloning and functional analysis of genes and with the modification of existing genetic traits in non-pathogenic microorganisms and plants such as *Arabidopsis thaliana* and *Nicotiana tabacum*, *Pinus radiata* and *Picea abies*. A number of transgenic *Pinus radiata* and *Picea abies* trees have been developed to evaluate the expression of

imported genes which include marker genes, those for antibiotic resistance, genes involved in herbicide resistance and genes involved in wood quality [IP2].

Marker assisted selection (MAS) is being used by HortResearch to develop new, non-transgenic varieties of crop in fast-breeding programmes. Fast breeding involves genetic modification in the laboratory during the development of markers, allowing identification of plants containing desired genes. These plants can then be bred and cross-bred traditionally. HortResearch has already employed these techniques on apples and kiwifruit and hopes to extend their use to develop bioremedial trees and shrubs that will accumulate toxic residues from soils ([IP5] Gardiner).

Another area of plant-related genetic research is into functional genomics of insecticidal microbes. Insect pathogens (microbes and nematodes that specifically kill insects) provide a rich source of insecticidal bioactive proteins and enzymes. Bioactive products can be identified using laboratory techniques such as gene disruption (eg transposons), cloning and sequencing of genes. For example, genes encoding insecticidal proteins have recently been discovered in a bacterial disease of grass grub. Genes with insecticidal function have the potential to be incorporated into other microbes or plant genomes as a means of achieving pest suppression ([IP13] Goldson).

Transformation in plant studies

To study the expression of particular genes during plant development, the genes are cloned in hosts (often in *E. coli*) to increase the number of copies of the gene. These genes are then isolated and used as probes to monitor the expression of the gene during development. In some cases the gene product can be made in the genetically modified plant and the proteins used for more study or the production of antibodies ([IP15] McManus).

New Zealand has been the site of field tests for genetically modified crops. These include ([IP4] Dunbier, Timmerman-Vaughan; [IP75], [IP14], [IP61]):

- canola and corn modified for herbicide tolerance
- sugarbeet modified for herbicide resistance or performance
- wheat modified to improve agronomic performance, to stabilise genetic variability or for disease and insect resistance
- potato varieties modified to be blight-resistant or potato cyst nematode-resistant
- barley varieties modified to improve performance or for disease resistance
- brassica varieties modified for virus resistance, club root resistance, aphid resistance or herbicide resistance

- onion modified to improve performance
- lentils modified for herbicide resistance
- asparagus modified for herbicide resistance or to delay post-harvest senescence
- broccoli modified to delay post-harvest senescence
- triticale modified to improve performance
- peas modified for resistance to alfalfa mosaic virus
- tamarillos modified for virus resistance
- various ornamentals modified to produce longer or stronger stems, or to have new flower forms.

While some of these transformed plants have been developed in New Zealand, others are imported for field testing.

In many instances, along with the genes of interest (perhaps from bacteria or other plants), selectable marker genes (for example, resistance to the antibiotic kanamycin) are also introduced into the plant genome.

White clover, an important pasture plant in New Zealand, has no known natural genetic resistance to some common pests such as grass grub and porina moth larvae. AgResearch and its collaborators have identified and isolated genes encoding insecticidal proteins (*Bacillus thuringiensis* d-endotoxins and several proteinase inhibitors from both plants and animals). The mode of action of the encoded protein has been determined, and the gene (*cry1Ba1*) transformed into white clover using an *Agrobacterium* vector. Before the transformation process, the gene was modified by truncating it and by making its sequence more closely resemble plant genes ([IP13] Woodfield).

Lincoln University has transformed two fungi that may have biocontrol properties. The fungi have been modified to contain a gene for antibiotic resistance so that they can be identified, and a gene which is expressed as an enzyme that produces a blue colour when provided with a particular substrate. This will allow study of the further growth of the fungi and how they parasitise their hosts ([IP8] Stewart).

AgResearch is involved in trying to increase the available energy in pasture plants by introducing genes controlling carbohydrates (particularly fructans) into perennial ryegrass and white clover. To this end, a number of genes controlling carbohydrate synthesis and partitioning have been isolated from bacteria, fungi and other plants, and their effects on plant carbohydrate levels are being investigated. Further work on the transforming of white clover and perennial ryegrass with fructan-synthesising genes has also started ([IP13] Woodfield).

Meanwhile Crop and Food Research ([IP4] Davies) has developed a capability for genetically modifying the biosynthesis of plant metabolites, especially flavonoids and carotenoids which are involved in flower and foliage colour. The research into flavonoids has involved the creation of new cultivars of ornamental crops. Flavonoids include a range of compounds which may be useful at reducing the rates of cancer and heart disease, and so further transformation work may involve food crops. Carotenoids are also involved in flower colour and have health-promoting compounds, for example the precursor to Vitamin A. Further research into gene transfer protocols may allow extension of this work from ornamental species to food crops.

Another area of investigation at Crop and Food Research involves locating genes implicated in post-harvest senescence and the control of the senescence processes [IP4]. This research will have implications in the shelf-life of food crops, as will investigations by HortResearch into the coordination of expression of stress-related genes ([IP5] Newcomb).

HortReseach is also starting research into plant development by studying "gene cascades", where expression of genes is controlled by other genes. It is also identifying genes that code for enzymes responsible for making flavour and "nutraceutical" compounds in fruit and is isolating these genes so that they may (in future) be manipulated in fruit species ([IP5] Newcomb).

AgResearch is involved in isolating promoter and terminator gene elements with defined expression patterns from forage plants for use in other programmes. This will allow the expression of transformed genes to be targeted to specific plant parts ([IP13] Woodfield).

Medical applications

Genetic modification techniques are widely applied around the world in medical research and diagnosis and in the production of treatments, the generation of specific immunoreagents and the generation of antibodies and drugs [IP37]. New Zealand is no exception. The work in New Zealand is being carried out in hospitals, universities and biotechnology companies. It involves the diagnosis and investigation of human disease conditions, including cancer, asthma, multiple sclerosis, autoimmune deficiencies, viral diseases, prenatal conditions, Duchenne and Becker muscular dystrophy, Fragile X syndrome, Huntingtons disease, haemophilia, spinocerebellar ataxias, multiple endocrine neoplasma and myotonic dystrophy ([IP59] Morris, Love).

Genetically modified mice are important in much medical research. They are predominantly used in New Zealand for basic biomedical research applications such as understanding pathological or developmental processes, modelling disease to aid the testing or development of new therapies, or in understanding gene function [IP45].

Diagnosis

Studies carried out in New Zealand include investigations into the molecular cause, progression, treatment and prevention of inherited or acquired diseases. Predictive disease testing, carrier testing, prenatal diagnosis and diagnostic confirmation of genetic disorders all rely on gene identification techniques.

Auckland Healthcare Services uses genetic modification techniques involving DNA hybridisation to investigate and diagnose genetic disorders. Genetic modification techniques are also used for the detection of carriers of genetic disorders (such as cystic fibrosis), predictive testing of individuals who risk developing a genetic disorder later in their lives, and testing individuals for predisposition to a disorder [IP91].

National Testing Centre also uses diagnostic genetic modification technology to screen newborn babies for metabolic diseases. Infants are screened for treatable disorders including phenylketonuria, maple syrup urine disease, congenital hypothyroidism, congenital adrenal hyperplasia, biotinidase deficiency, galactosemia and cystic fibrosis. Genetically modified products are also used in testing patients with symptoms for possible metabolic disorders [IP44].

Treatment

Many drugs available for the treatment of disease are the result of genetic modification technology. Some of these drugs and vaccines available in New Zealand ([IP59] Dixon) include:

- recombinant insulin for diabetes
- recombinant growth hormone to treat deficiency of this hormone
- erythropoietin for anaemia associated with renal failure or cancer
- recombinant human coagulation factors for haemophilia
- pulmyzyme for the treatment of cystic fibrosis
- cholera vaccine (live; subsequently withdrawn)
- monoclonal antibody for breast cancer
- plasminogen activator for myocardial infarction
- interferons α, β and γ

- interleukin-2 for cancer
- DNAase for cystic fibrosis
- α-1 antitrypsin for emphysema
- follicle stimulating hormone for infertility
- glucocerebrocidase for Gaucher disease.

Once diagnosed, some metabolic disorders, such as phenylketonuria (PKU), can be treated by diet modification. Others, such as Gaucher disease, may be treated by supplying the missing enzyme (glucocerebrocidase) which is produced by genetic modification technology. Much research is being done to develop other replacement enzymes and gene therapies [IP44].

In 1996, a gene therapy trial for Canavan disease was approved ([IP59] Dixon). The trial, which was not effective, was completed in 1997.

Cancer immunotherapy approaches using genetically modified mice have been used to establish and validate clinical trials where patients with non-Hodgkin's lymphoma are transfused with their own immune cells sensitised in vitro to recognise their own tumour cells as foreign [IP10].

Research

Genetically modified mice are particularly important in medical research. These mice may have genes inserted, mutated or deleted, often so that they mimic human diseases. Such studies in New Zealand ([IP45] Eccles, Hampton, McCormick) include:

- At Christchurch School of Medicine, a mouse model of the inherited disorder X-linked adrenoleukodystrophy has been developed and a mouse model lacking a cardiac hormone (BNP) is being developed.
- A team at AgResearch has developed a mouse lacking the STAT5b gene to study a model of a growth disorder.
- Researchers at Otago University use transgenic mice which express human genes involved with the development of heart disease. They are specifically interested in genes which are involved with the assembly of lipoproteins.
- Christchurch School of Medicine has imported mice with a gene knockout that prevents their white blood cells from making the chemicals necessary to kill bacteria. This genetic modification mimics a human condition known as chronic granulomatous disease (CGD).
- Mouse models lacking immune system genes are being developed by Malaghan Instutute to understand treatment of cancer, asthma and multiple sclerosis.

As well as genetically modified mice, research projects at Malaghan Institute use recombinant products including interleukins, interferons, colony-stimulating factors, peptide hormones and immuno-modulatory proteins.

Cancer research is a major investigative field in New Zealand. There are projects investigating the basis for, behaviour and development of novel treatments for cancers. This work is leading to the development of new approaches for cancer treatment, some of which have entered the clinical trial phase. Other work has led to the identification of the genetic cause for some types of tumour, for example stomach carcinoma. There are also investigations into why some tumours, such as breast cancers, spread, and how tumours have the ability to stimulate formation of new blood vessels [IP19].

Malaghan Institute has made investigations into how altered genes lead to a loss of control of normal cell development. This helps with understanding regulatory genes and their role in cancer. To better understand cytokine gene function, the Institute uses mice, modified either to not produce or to over-produce a cytokine, or mice which have modified immune systems [IP10]. Gene expression by cytokines is also being studied by University of Auckland to understand better the mechanisms involved in parturition in women. It is hoped that this will allow the development of treatments and strategies to prevent preterm births [IP27].

In other cancer research at Malaghan Institute, populations of tagged killer cells from genetically modified mice are monitored. Each population has a specificity for a unique tumour protein expressed by developing genetically modified tumours ([IP10] Harris).

University of Otago is also involved in cancer research and is using gene mapping to look at chromosome 14 deletions associated with renal cancer. Researchers are using genetic pedigrees and gene expression analysis to look at inherited susceptibility to gastric cancer in a large Maori family, and analysis of special gene mutations to identify pathways required for normal kidney development that are repressed in child cancer patients [IP27].

University of Auckland has a programme to examine the molecular basis of Huntingtons disease using transgenic mice and sheep models, and it is working towards developing gene therapy techniques for neurodegenerative diseases in humans [IP27].

Salivaricin B helps control streptococcal infections caused by *Streptococcus pyogenes*. This antibacterial protein, discovered by researchers at University of Otago, is produced by *Streptococcus salivarius* microorganisms. BLIS Technologies was formed to pursue the commercialisation of the Salivaricin B-producing *Streptococcus*

salivarius microorganisms, as well as the identification of other microorganisms producing bacteriocin-like inhibitory substances (BLIS) with human or animal health benefits ([IP26] Parker). Gene inactivation procedures are used to control the expression of these genes in bacterial hosts ([IP19] Tagg).

As part of its asthma studies, Malaghan Institute uses DNA polymorphisms in the beta2-adrenergic receptor to examine disease severity. Transgenic and knockout mice models are being used to examine the regulation of immune responses [IP27].

Genetic modification and genetically modified organisms are currently being used in New Zealand to better understand malignant hyperthermia (MH), a genetic syndrome, which usually has no symptoms unless the patient is exposed to certain types of anaesthesia ([IP15] Stowell).

University of Otago has identified mutations in a gene responsible for a rare disease in humans that causes blindness and kidney disease. In the laboratory, genetically modified bacteria, viruses, yeast, insect and mammalian tissue culture cells provide vectors and substrates for manipulation of DNA isolated from patients as part of investigations to identify specific features of the disease or experimental treatments for it [IP98].

Pure research and teaching

Some of the work described above may fit into the category of pure research, while some of the work described here could also fit into one of the above categories. Research and the application of that research are often intimately connected.

Teaching

New Zealand universities use genetic modification techniques, both for teaching and as research tools. Teaching involves not only lectures about the applications and results of genetic modification technology but also laboratory work on the fundamental techniques, including recombinant DNA technology [IP15].

Environmental effects of genetic modification

In addition to teaching, University of Canterbury engages in work with transgenic organisms to better understand horizontal gene transfer. This, in turn, aids understanding of the effects of release of genetically modified organisms into the environment [IP7]. AgResearch is also investigating horizontal gene transfer, particularly by bacterial plasmids in New Zealand soils ([IP13] Goldson]).

In related research, AgResearch scientists are looking at the environmental impact of transgenic plants developed to express insecticidal toxins. The research uses genetic manipulation involving cloning and expression of inserted marker genes.

This will enable the quantification of the effects of transgenic plants and breakdown products on soil ecosystems, including soil foodweb composition, biomass and nutrient status ([IP13] Goldson]).

HortResearch scientists, together with AgResearch, are analysing insecticidal transgenic plant impacts on bees, and investigating beneficial insects and soil microbes and nematodes ([IP13] Goldson]; [IP5] Malone).

Genomics

International work has mapped the human genome, and mapping of probes onto human chromosomes for gene identification has been done in this country. New Zealand has also been the site of work into the clarification of poorly mapped regions of the human genome ([IP59] Morris]).

Collaborative work between New Zealand and United States-based Physiome involves building a computer-based tool that will be used to create virtual cells, tissues and organs in a computer (biometrics). To run simulations, data regarding genes, proteins and protein interactions will be needed. This data will be generated using genetic modification technologies in laboratories world-wide ([IP23] Levin).

Brain process studies

Cellular mechanisms of learning and memory in the brain are being researched at Otago University. One of the aims of the research is to identify changes in gene expression in the brain during development of memory in a rat model. Genetic modification techniques will be used [IP27].

Food

Foods containing genetically modified ingredients are not commercially produced in New Zealand. However, various foodstuffs and feeds that are imported into New Zealand may contain ingredients which are genetically modified [IP56]. The main genetically modified ingredients are soybean, corn, canola, cotton, potato and sugarbeet. These are used in a wide variety of food products, including soups, sauces, processed meats, dairy products, baked goods, oils, spreads, confections and snack foods [IP54].

Funding of genetic modification research

Funding for projects that may include genetic modification technologies comes from both the government and the private sector and includes funding from local, national and international funding agencies and from charitable trusts and donations. Researchers report receiving funding from such government agencies

as the Health Research Council of New Zealand, Lottery Health Board, Marsden Fund, Public Good Science Fund and New Economy Research Fund, from charitable organisations and special-interest bodies such as the National Heart Foundation of New Zealand, New Zealand Dental Research Foundation, Cancer Society of New Zealand, Wellington Medical Research Foundation, Asthma Foundation, Multiple Sclerosis Foundation of New Zealand, Otago Community Trust, Otago Research Committee, and from international groups such as the Wellcome Trust and Novartis ([IP10]; [IP19] Tagg, Guilford).

The exact amount of money spent on genetic modification technology and research is unknown because budgets usually do not class genetic modification technologies separately from the broader research and development categories. However, some figures are available.

The recent Statistics New Zealand *Modern Biotechnology Activity in New Zealand* survey estimated that the enterprises they questioned spent around $405 million (in the year ending June 1999) on modern biotechnology; $276 million of this was the estimated expenditure for the private sector, while the public sector enterprises estimated that they spent $129 million. The value of income associated with modern biotechnology in the same year was estimated by the respondents to be $475 million. Private sector earnings were estimated to be $326 million of this figure, while the public sector earning were estimated to be $149 million. However, Statistics New Zealand urges caution in the use of the quantitative financial data, because of the difficulty experienced by the respondents in isolating modern biotechnological expenditure from their other expenditure.

FRST [IP21] invests about 80% of Government's overall research, science and technology funds. FRST estimates that $130–135 million may be invested in research programmes that may involve genetic modification technologies. Further, the Foundation estimates that genetic modification technologies are key in about 9% of projects in which it invests.

Health Research Council of New Zealand [IP27] is a government agency that was responsible for investing $40.3 million in health research in the 2000–2001 year. It estimated that 30% of the contracts it funded involved the use of genetic modification technology, accounting for about $16.1 million of the total.

AgResearch [IP13] estimates that it invests $25 million in research and development projects that involve genetic modification, genetically modified organisms and products. Crop and Food Research [IP4] estimates that its projects using molecular techniques as research tools received $2.5 million in funding, proof of concept projects that may or may not have used genetic modification received $3.1 million

and that $1.7 million of funding was spent on the development of genetically modified products. Landcare Research [IP12] estimates that it is currently involved in $2.8 million worth of genetic modification-related research, though less than $700,000 directly uses genetic modification or evaluates genetically modified products. New Zealand Dairy Board [IP67] has secured funding of up to $150 million for advanced biotechnology over the next five years.

Funding at Otago University for BLIS research (see above) over the period 1996–1999 has been estimated at over $1.5 million ([IP19] Tagg). University of Auckland Faculty of Medical and Health Sciences estimates expenditure of about $20 million annually on biotechnology-related projects: it estimates that Faculty of Engineering spends less than $500,000 annually on biotechnology and School of Biological Science around $13.5 million annually ([IP16] Condor).

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Production of Gene Knockout Mice. The Transgenic Gene Knockout Unit (TGKU) of the Molecular Laboratories at NUMI.http://numi.crc.nus.edu.sg/numiweb/service/tgku.htm#Production of Gene Knockout (May 2001).

Transgenic Techniques for Analysing the Mouse Genome. http://rank.usask.ca/316/mouse/nucmut.html (May 2001).

Statistics New Zealand. 2001. *Modern Biotechnology Activity in New Zealand*. http://www.stats.govt.nz/ (May 2001)

"Interested persons" referenced above (submissions and witness briefs are publicly available on the Commission website (http://www.gmcommission.govt.nz) until 30 June 2002):

[IP2] New Zealand Forest Research Institute

[IP3] Wrightson

[IP4] Crop and Food Research, including witness briefs from Dunbier, Timmerman-Vaughan, Davies

[IP5] HortResearch, including witness briefs from Gardiner, Malone, Newcomb, Ross

[IP7] University of Canterbury

[IP8] Lincoln University, including witness briefs from Bickerstaffe, Palmer, Stewart

[IP10] Malaghan Institute of Medical Research, including witness brief from Harris

[IP12] Landcare Research

[IP13] AgResearch, including witness briefs from Goldson, L'Huillier, McNatty, Woodfield

[IP14] Aventis CropScience

[IP15] Institute of Molecular BioSciences, Massey University, including witness briefs from McManus, Sarre, Stowell

[IP16] University of Auckland, including witness brief from Condor

[IP19] University of Otago, including witness briefs from Wallis, Tagg, Guilford

[IP21] Foundation for Research, Science and Technology

[IP23] Auckland UniServices, including witness brief from Levin

[IP25] Biotenz, including witness brief from Wakelin

[IP26] A2 Corporation, including witness brief from Parker

[IP27] Health Research Council of New Zealand

[IP28] New Zealand Veterinary Association, including witness brief from Squires

[IP34] Federated Farmers of New Zealand

[IP35] New Zealand Feed Manufacturers Association/Poultry Industry Association of New Zealand/Egg Producers Federation of New Zealand, including witness brief from Diprose

[IP37] Council of Medical Colleges in New Zealand

[IP44] National Testing Centre

[IP45] New Zealand Transgenic Animal Users, including witness briefs from Eccles, Hampton, McCormick, McLennan

[IP47] New Zealand Biotechnology Association

[IP54] New Zealand Grocery Marketers Association

[IP56] New Zealand Arable-Food Industry Council

[IP59] Human Genetics Society of Australasia, New Zealand Branch, including witness briefs from Morris, Love, Dixon

[IP61] Bio Dynamic Farming and Gardening Association in New Zealand

[IP67] New Zealand Dairy Board

[IP75] New Zealand Vegetable and Potato Growers' Federation/New Zealand Fruitgrowers' Federation/New Zealand Berryfruit Growers' Federation

[IP76] Environmental Risk Management Authority

[IP77a] Royal Society of New Zealand (biological sciences)

[IP85] SAFE (Save Animals From Exploitation)

[IP91] Auckland Healthcare Services

[IP92] New Zealand Association of Scientists, including witness briefs from Penny, Heath

[IP98] New Zealand Organisation for Rare Diseases.

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appendix 1

Context and process

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Section contents

3.1 Establishment of the Commission

Introduction

This section outlines the process involved in setting up the Royal Commission.

Reference has already been made to the political environment in which the Commission was established (see "New Zealand: political framework" in "New Zealand context" above). This section refers primarily to the process of implementing Government's decision to establish the Commission, as announced in the Speech from the Throne at the Opening of Parliament on 21 December 1999.

This section draws on *Setting up and running commissions of inquiry*, a document prepared by the Department of Internal Affairs (DIA) and released in March 2001.

Establishing the Commission

Following the announcement in the Speech from the Throne, preparations for a Royal Commission began.

In March 2000, the Minister for the Environment was appointed the Minister in charge of the inquiry, Ministry for the Environment (MfE) oversaw the drafting of

the 'Terms of reference' (the Warrant) and DIA were responsible for the administrative role of setting up the Commission.

Cabinet allocated a provision al budget of $4.8 million on 17 April 2000, later extended to $6.2 million on 7 August 2000.

Government announced a voluntary moratorium on all applications to field test or release genetically modified organisms, for the period 14 June 2000 to 31 August 2001.

The Warrant

A working party, led by MfE, prepared the Warrant. It included officials from the Department of the Prime Minister and Cabinet, Ministry of Research, Science and Technology, Ministry of Health, Treasury, Department of Conservation, Ministry of Fisheries, Te Puni Kokiri (Ministry of Maori Development), Environmental Risk Management Authority, Ministry of Foreign Affairs and Trade, State Services Commission, Ministry of Agriculture and Forestry and DIA.

The Warrant required the Commission to report on the strategic options available, now and in the future, and any changes considered desirable to current legislative, regulatory, policy or institutional arrangements with regard to genetic modification, genetically modified organisms and products. The Warrant also referred to 14 'relevant matters' on which the Commission was authorised to receive representations.

Excluded from the Commission's terms of reference were "the generation of organisms or products using modern standard breeding techniques" including cloning, mutagenesis, protoplast fusions, controlled pollination, hybridisation, hybridomas and monoclonal antibodies.

The Warrant included definitions of 'genetic modification' (also referred to as genetic engineering), 'genetically modified organism', 'organism' and 'product'.

The Commission was sealed, approved by Order-in-Council on 8 May 2000, and published in the *New Zealand Gazette* on 11 May 2000. A copy is included in this volume, in English and Maori (see "Operational detail: Terms of reference").

Appointments

Commissioners

As with all commissions of inquiry, the number and selection of Commissioners is at the discretion of the Minister in charge of the inquiry.

Since the processes of a commission of inquiry usually raise legal issues, it is customary to appoint a Judge (retired or sitting) or a lawyer to the position of Chair.

While there is no statutory limit to the number of Commissioners for an inquiry, the Minister selected four people who represented a good balance of experience, skills and outlook.

The Minister invited The Right Honourable Sir Thomas Eichelbaum, a former Chief Justice of New Zealand, to chair the Commission. The Right Reverend Richard Randerson, Dr Jean Fleming and Dr Jacqueline Allan were also invited to join the Commission.

Full biographical details of the Commissioners are contained later in this volume (see "Operational detail: Commission members").

Counsel Assisting

It is usual for commissions of inquiry in association with Crown Law, to appoint practising lawyers as counsel assisting the commission to:

- advise the Commission on its role and how to interpret its Warrant
- liaise with Interested Persons and their lawyers on matters of process
- ensure that all the relevant evidence and information is brought before the Commission
- ensure hearings are conducted in a fair and balanced manner
- advise the Commission on legal issues throughout the inquiry.

This role was shared by Brendan Brown QC, John Upton QC, and Grant Pearson.

Liaison Officer

As the Commissions of Inquiry Act 1908 does not authorise a commission to enter into contracts and employ staff, DIA takes this role.

To meet this obligation, a DIA Liaison Officer is appointed to each Commission at the outset to ensure the Commission has the financial resources required to carry out its mandate, coordinate the budget process, ensure the Commission's operational processes are supported by DIA's corporate processes and supply advice on human resourcing. The Liaison Officer is also responsible for ensuring an inquiry meets its policy, government and operational requirements.

Secretariat

All Commission staff are employed by DIA as the Commissions of Inquiry Act 1908 (The Act) does not provide for the employment of staff to provide technical

and administrative support to the Commission, a Chief Executive Officer, an Information Officer, a Policy Adviser, a Media Officer, and an Administration Officer were appointed.

Additional staff including researchers, analysts, writers, editors, translators, advisers and transcribers were contracted to the Secretariat as and when required.

Commission location

The Commission Secretariat was based on level 8 of Dalmuir House, 114 The Terrace, Wellington. Level 11 of the same building was modified to accommodate the hearing room for the Formal Hearings of Interested Persons.

Planning the inquiry

On 12 May 2000 the Commissioners held their first meeting, to determine their roles and obligations under the Warrant.

Background papers

Following planning meetings, the Commissioners identified the need for background information on the aspects of genetic modification referred to in the Warrant to assist them to best develop a strategy for meeting the terms of reference. Papers on the following topics were commissioned, some of which were peer reviewed:

- Current uses
- Legal aspects
- Ethical issues
- Public perceptions
- Maori aspects
- Environmental aspects
- Economics
- Human health aspects
- The international aspects of genetic modification.

Copies of the background papers were placed on the Commission website and a complete list, with indication of peer review and detail on the authors, is located later in this volume (see "Operational detail: Background papers and authors").

Consultation programme

The Commission developed a consultation programme that involved:

Planning hui	
Rotorua	21 July 2000
Public Scoping Meetings	
Wellington	7–9 August 2000
Application Hearings for Interested Persons status	
Wellington	10–11 August, 5 September 2000
Public written submissions	
Nationwide	7 August 2000–1 December 2000
Public Meetings (15)	
Nationwide	18 September–16 November 2000
Formal Hearings	
Wellington, Auckland, Christchurch	16 October 2000–15 March 2001
Maori consultation workshops (28)	
Nationwide	24 October 2000–13 March 2001
Regional and National Hui (11)	
Nationwide	4 November 2000–8 April 2001
Youth Forum	
Wellington	5 March 2001
Public opinion telephone survey	
Nationwide	22 March 2001–8 April 2001

These consultation methods were designed to meet the Commission's terms of reference and its obligations under the Act. As with all inquiries, the procedures adopted are the prerogative of each commission. Details regarding each process are contained within this volume.

Web site

To meet the Commission's objective of transparency in its processes, and facilitate communication with the public, a website was developed. This went live on 28 July 2000.

During the inquiry, information was published on the website including: copies of the Warrant in English and Maori; biographical and contact details; application, registration and submissions forms; transcripts of Formal Hearings, Public

Meetings, Hui and Youth Forum; copies of Interested Person and Public submissions; news releases; background papers; and consultation schedules.

The website will be maintained at http://www.gmcommission.govt.nz until at least June 2002.

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3.2 Scoping Meetings: the process

Introduction

After its appointment on 8 May 2000, the Commission requested preparation of background papers on nine major aspects of the subject of the Commission: current uses, legal aspects, ethical issues, public perceptions, Maori aspects, environmental aspects, economics, human health aspects and international aspects of genetic modification. These aspects were identified in the Commission's Warrant (its terms of reference). The authors writing these papers were asked also to provide a list of questions and issues likely to be considered during the course of the Commission's process. The lists of issues raised by authors of the background papers became the basis for the consultative activities of the Commission's Scoping Meetings.

By June 2000, the Commission had clarified how it might best fulfil its obligations to ensure that the people of New Zealand were fully consulted. It resolved that consultation should begin at the earliest possible stage, namely, in the organisation of the Commission's processes. The first event in scoping and consultation with the New Zealand public was an initial hui in Rotorua (see "Processes of the Commission: Maori Consultation" later in this volume). Then the Commission announced by public notice on 27 July 2000 that public meetings were to be held in Wellington on 7–9 August 2000 to scope the questions for subsequent submissions by Interested Persons and others so that no issues additional to those already identified might be overlooked in the deliberations. (For an explanation of Interested Person status — ie, having the right to present submissions to the Commission at Formal Hearings — see "Processes of the Commission: Formal Hearings" below.)

The Commission placed prominent advertisements for the Scoping Meetings in national newspapers, prepared an information pack for participants and established a website to enable a wide dissemination of information and to allow participation by the public in the course of the Commission's activities.

This section outlines the nature of the consultative process for the Scoping Meetings. It briefly describes:

- information for participants
- forms of participation
- mechanisms of participation.

Information for participants

Information on the Scoping Meetings was available as an information pack and on the Commission's website (http://www.gmcommission.govt.nz/). The information pack for participants in the meetings contained:

- an introduction to the Commission's planning for submissions
- a copy of the official Warrant (the terms of reference for the Commission) as published in *New Zealand Gazette* of 11 May 2000
- a translation of the Warrant in Maori
- a programme for each day of the meetings
- a list of key questions and discussion questions for each of the groups of issues: human health, consumer choice/labelling, cultural/spiritual, environmental, economic, future uses of genetic modification technology, ethical, global developments, strategic opportunities
- a glossary of genetic modification terms
- an application form for Interested Person status
- contact information.

Material posted on the Commission's website relating to the Scoping Meetings included the terms of the Warrant, the background papers, the programme for the meetings and information on how people could participate via the Internet if they could not attend the Wellington meetings.

Forms of participation

People could participate in establishing the range of issues to be considered by the Commission either in person at the WestpacTrust St James Theatre, Wellington, on any or all of the three days of Scoping Meetings or by participating in the online communications on the same days (7–9 August 2000) and for a period of 10 days thereafter. Some participants in the scoping process also sent written comment or emails to the Commission.

Direct participation

Up to 200 people attended each of the three Wellington meetings. Many attended all three. A powhiri was performed at the first Scoping Meeting to welcome participants to the consultative process.

The Opening Statement made by the Chair on behalf of the Commission stressed that the Commission had been established as an independent body to investigate and report on the issues arising. The task was a significant one, both for the New Zealand community and internationally. Government decisions following the Commission's Report might well be irreversible. So it was critical that the opportunity for a rational discussion was used to best advantage.

The Chair said that the Commission's processes would be open and inclusive. He outlined the various processes the Commission would follow, to fulfil its obligation to consult with the people of New Zealand. He referred to the fact that until the Commission had reported, and Government had made decisions on the outcome, the future direction of the country in regard to genetic modification was uncertain, and many important decisions would remain on hold. Thus it was important that the Commission should complete its task in a timely way.

In the workshop activity of the scoping process, a facilitator guided the sessions each day. Participants were given writing materials. They formed discussion groups of (usually) no more than nine members and elected a recorder and a reporter for each group. The facilitated meetings used a "consensus card sort" process (described below and in "Processes of the Commission: Public Meetings"), which was designed to maximise participation and to focus on an idea or issue rather than its presenter.

Online participation

People who were unable to attend the Wellington-based Scoping Meetings in person but who wished to express views on issues that the Commission should consider had the option of participating by means of the Internet. The online communications also enabled attendees of the meetings to express additional considerations after the discussion groups had ended.

Mechanisms of participation

Scoping process mechanisms involved:

- topics, issues and questions (a prior categorisation of the subject)

- "consensus card sort" process (the method used for on-the-spot reception and recording of contributions at the Scoping Meetings)
- the online contribution mechanism.

Topics, issues and questions

The three days of the Scoping Meetings were separated according to major topics relating to genetic modification: crops and food (7 August 2000), medical uses (8 August 2000) and international legal obligations/intellectual property issues/liability issues/Treaty of Waitangi (9 August 2000). Topics of days 1 and 2 were further broken down into important aspects of the Warrant: human health, consumer choice/labelling, cultural/spiritual issues, environmental issues, economic issues, future uses of genetic modification technology, ethical issues, global developments, and strategic opportunities and issues.

The information packs for the meetings contained a list of "key questions" (such as: "What are the health risks and benefits associated with GM foods?") and "discussion questions" (such as: "What are the concerns about potential health hazards associated with GM crops or food, eg potential for new allergens, toxins, antibiotic resistance?") on each topic. These questions were provided to help stimulate contributions but were subordinate to a single "overarching question" that was assigned to each topic/major aspect combination. As an example, participant groups in the meeting of day 1 (Crops/Food) block 1 (human health issues, consumer choice/labelling issues, cultural/spiritual issues) could choose to respond to one of three questions:

- What are the human health issues associated with the genetic modification of food and crops?
- What are the consumer choice and labelling issues associated with the genetic modification of food and crops?
- What are the cultural and spiritual issues associated with the genetic modification of food and crops?

"Consensus card sort" process

Under the "consensus card sort" process, a group selected its questions and members wrote responses on white "individual cards", one issue or idea per card. The cards were gathered together, shuffled and redistributed. Participants voiced their interpretation of the written contribution of another individual. (The writer could clarify the issue if necessary.) Group members checked on the other cards that they held to see if the issue or idea was duplicated. Cards that the group

considered repeated the same contribution were stacked with the card under discussion. Then the issue or idea was summarised and written on a coloured "group card" to top the stack.

Repetition of the process within the group resulted in all individual card contributions sorted into piles topped by coloured group cards. The stacks were then sorted into category, again by group consensus, and the categories recorded on flip charts as a summary of the group's deliberations.

Online contribution mechanism

The Internet process used:

- an online publication, with information on meeting programmes and other background information, instructions on how to participate, the key issues under discussion and the facilitator's summaries
- an email newsletter containing summaries of items under discussion, with links to further information on the publication and the "consensus card sort" process
- a "views recorder" allowing online participants to record their views as "virtual attendees" of the Scoping Meetings, as well as allowing meeting attendees to add any contributions that they were unable to record at the meeting sessions.

A help-desk assisted contributors to register for online participation. Throughout the course of each day's meeting facilitators continually updated the online publication and included a summary of the day's findings.

During the 10-day period that the online participation mechanism was active, it enabled people to contribute to the scoping process or to view the proceedings and contributions without limitation of geography or time of day. Several hundred online contributions were received. Individual online contributions, together with summaries of the issues developed at the Scoping Meetings and the written contributions, were available to the public via the Commission's website during this period. A summary of the issues raised throughout the entire scoping process was retained on the website after the online participation ended.

The outcomes of the Scoping Meeting process (ie, three days of meetings and online participation, as well as some written contributions) are reported in Appendix 3 (see "Scoping Meetings: Summary of outcomes").

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Context and process

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3.3 Formal Hearings: the process

Introduction

The Royal Commission developed an extensive public consultation programme to meet the requirements of its terms of reference (Warrant) and its obligations under the Commissions of Inquiry Act 1908 (the Act).

The consultation programme included Formal Hearings, Public Meetings, Hui, Public Submissions, a public opinion survey and a Youth Forum.

This paper summarises the process involved in conducting Formal Hearings of presentations by Interested Persons, over a total period of 13 weeks.

An analysis of the Interested Persons' submissions, their witnesses' evidence and subsequent cross-examination, during the Formal Hearing process, is presented in Appendix 2 of this report.

Regulatory requirements regarding consultation process

This Commission, as with all commissions of inquiry, was bound by the provisions of the Commissions of Inquiry Act 1908, including section 4A(1), *Persons entitled to be heard*.

The relevant definition of 'person' is in section 30 of the Interpretation Act 1999:

> 'Person' includes a corporation sole, and also a body of persons, whether corporate or unincorporated.

Section 4A(1) of the Commissions of Inquiry Act identifies the situations in which a person is 'entitled to appear and be heard at the inquiry'. These include where a person is 'party to the inquiry' or where a person satisfies the Commission that they have 'an interest in the inquiry apart from that in common with the public'.

In addition, section 4A(2) of the Act states:

> Any person who satisfies the Commission that any evidence given before it may adversely affect his interests shall be given an opportunity during the inquiry to be heard in respect of the matter to which the evidence relates.

No person made application under this provision.

The Warrant establishing the Commission does not name any specific 'parties' to the inquiry, nor has the Commission cited any parties; therefore the second part of section 4A(1) is the applicable criteria governing Interested Person status before the Commission. In terms of that provision, those seeking Interested Person status must satisfy the Commission:

- that they have "an interest in the inquiry", that is, an "interest" in the Inquiry on Genetic Modification, and
- that their interest is "apart from that in common with the public".

Those accorded Interested Person status had the right to appear before the Commission in person (or by their counsel or agent) and give oral evidence.

Commission interpretation of regulatory requirements

As stated in the Commission's opening address at the public Scoping Meeting, a Commission is quite different from a court of law as nobody is on trial. In its address the Commission also outlined the principles for its consultation process:

> Subject to the basic requirements set out in the Commissions of Inquiry Act, and the directions given in the Warrant, we are entitled to fix our own procedure, and to gather our information and conduct our investigations in the way we think is most suitable. In carrying out our mandate to consult the public of New Zealand we wish to be as open as possible, and as inclusive as we can, giving everyone who wishes to present their views to us a fair and reasonable opportunity, although not necessarily by way of a personal appearance. Clearly there will be practical limitations; everything we would like to do, or people would wish us to carry out, will need to be accommodated within the limits of our resources, both of time and in physical terms.

To ensure transparency of its processes, the Commission announced that all of its hearings would be in public, and that oral evidence given at its Formal Hearings would be recorded and the transcripts placed on the Commission website.

The Commission also stated that confidentiality of information could be sought and where granted, those submissions could be heard in private or remain unpublished. However, confidentiality would be granted only in exceptional instances. In the event, no evidence was heard in confidence.

The Commission determined that Interested Persons, while not having a 'right' to cross-examine other Interested Persons and their witnesses, were able to apply for leave to do so. Leave was freely granted, although at times the Commission had to place limits on the length of the cross-examination.

Establishing the consultation programme

The Commission's Formal Hearing process included the following components:

Application for Interested Person status

- applications in writing for Interested Person status
- oral presentations in support of applications, at the discretion of the Commission.

Written submissions

- written submissions by Interested Persons and their witnesses.

Formal Hearings

- oral presentation of submissions by Interested Persons, and their witnesses
- cross-examination of presenting Interested Persons and their witnesses by other Interested Persons, their representatives or legal counsel, and by Counsel assisting, at the discretion of the Commission
- questions by the Commissioners.

Additional presentations

- oral presentation of evidence by individuals and organisations not accorded Interested Person status, at the invitation of the Commission.

Rebuttal and new evidence

- application to present new evidence that arose after an Interested Person appeared before the Commission
- written application to present rebuttal evidence that could not reasonably have been foreseen and referred to in the original presentation
- oral presentation of new and rebuttal evidence, at the discretion of the Commission.

Closing and legal submissions

- written closing submissions by Interested Persons
- written legal submissions by Interested Persons
- oral presentation of closing and legal submissions, at the discretion of Interested Persons.

Documents tabled during Formal Hearings

- documents presented to the Commission during the Formal Hearings, which were tabled and listed on the Commission website.

Application process for Interested Person status

The Commission called for applications for Interested Person status in its first public notice, placed in the 22 national daily newspapers on 29 July 2000. By closing date (4 August 2000), some 265 applications were received. Having considered all applications, the Commission concluded, on the basis of the written information provided, that a number were sufficiently clear-cut to enable the Commission to grant Interested Person status without further submissions at its applications hearing.

On 10 and 11 August 2000, the Commission proceeded to hear oral submissions in support of applications from those who had not already been accorded Interested Person status.

In its written Decision, released on 17 August 2000, the Commission accorded status to 109 applicants (later amended to 110).

In addition, the Decision identified 21 persons whose applications were not received in time to be heard on 10 and 11 August 2000 and noted that these would be heard at a subsequent hearing.

On 21 August 2000 the Commission issued a news release announcing the outcome of the application process. The release noted that the consultation programme would commence with a series of Public Meetings, the first to be held on 18 September 2000.

The news release also addressed concerns regarding the interpretation of section 4A(1) of the Act, raised by some unsuccessful applicants for Interested Person status. The Commission stated "it was obvious many members of the public were acutely interested in the inquiry and often highly informed … many people [were] concerned to varying degrees of intensity but, by itself, this [did] not amount to 'an interest apart from that of the general public'".

At its second application hearing on 5 September 2000, the Commission heard from the 21 persons identified in its decision of 17 August 2000. At this hearing it also dealt with a small number of applicants who had been unable to attend the earlier hearing, and six late applicants. The Commission also sought clarification from two previous applicants.

On 14 September 2000, the Commission released a Supplementary Decision according Interested Person status to a further seven organisations.

At the conclusion of the two application hearings, the Commission had considered 292 applications for Interested Person status, deciding that 117 were considered to met the statutory criteria.

A total of 15 applications for Interested Person status were received from Maori or Maori organisations, of which seven were accorded status.

During the course of the Inquiry, a further five applications were received and processed but no further applicants were granted Interested Person status.

Copies of the Commission's decisions on applications and lists of successful applicants were posted on the Commission website.

Establishing the Formal Hearings procedure

Next, the Commission set about establishing the procedure for receiving written submissions, and the Formal Hearing process.

In establishing its processes, the Commission was mindful of, among other things, the need to utilise the limited hearing time efficiently; provide certainty to Interested Persons with respect to the date on which they were to appear before the Commission; and ensure that the process was fair and equitable to all Interested Persons irrespective of whether they were to be heard in the early or latter stages of the process.

In order to achieve these objectives, the submission and hearing process of Interested Persons included the following parameters:

- Submissions and witness briefs would be provided and read in advance so that, in their presentation at the Formal Hearings, Interested Persons and witnesses would be speaking to their submission or briefs rather than reading the evidence verbatim.
- This approach, coupled with the Commission placing the submission and briefs on the website 10 working days prior to the Interested Person being heard, allowed other Interested Persons to prepare any cross-examination in advance.
- The total presentation time allocated of 80 minutes per Interested Person would allow for the presentation of evidence by submitters and their witnesses, and leave a reasonable opportunity for cross-examination, and questioning, by the Commission
- Requiring other Interested Persons to give three days notice to seek leave to cross-examine would enable the Commission to utilise the allocated hearing time efficiently by gauging the relative interest in cross-examining Interested Persons appearing on the same day.
- The Commission's discretion in allowing cross-examination and controlling the time would reduce the duplication of questioning and information presented to it.

Notification of Formal Hearing process

On 31 August 2000, the Commission released its first 'Notification to Interested Persons' (Notification) outlining the procedures on the following aspects:

- filing of written submissions, including briefs of evidence (witness briefs)
- the availability of submissions received from Interested Persons
- the format and time frames for appearances before the Commission
- procedures for cross-examination of the evidence of other Interested Persons
- Notice of Closing Submissions.

The Notification also advised the timetable for Formal Hearings, beginning on 16 October 2000.

The indicative timetable grouped Interested Persons broadly on the basis of 'like' organisations. For example, one group included organic farming groups and another included Crown Research Institutes (CRIs). The groups were then allocated to weeks within the Formal Hearings schedule, based on the premise the Commission could hear two to three Interested Persons per day over the initial 12-week Formal Hearing period.

The Notification also included a format for the presentation of written submissions (Form 1) and witness briefs (Form 2) based on the subject matter outlined in the Warrant.

Interested Persons were encouraged to use the formats provided, in the interests of consistency and to enable a framework for the analysis of submissions to be developed corresponding the specific items of the Warrant.

The Notification provided a timeline for the receipt of written submissions and witness briefs from Interested Persons which comprised rolling deadlines for those appearing in the first four weeks of hearings, the remainder being required to file their material by 30 October 2000.

The Notification advised that generally Formal Hearings would be held in Wellington, but indicated that, where appropriate, the Commission would conduct hearings in Auckland or Christchurch.

The Notification advised of the procedures for making a submission, or presenting to the Commission, in Maori.

The Commission also issued a news release announcing its Formal Hearings schedule and outlining the hearings process, which would be open to the public. The release referred to the Commission's public written submission process

available for those who had not obtained Interested Person status yet wanted to contribute to the Commission's body of evidence.

In addition to notifying all Interested Persons individually, the Commission placed the notifications, schedules and forms on its website.

The Commission formally announced its consultation programme by public notice in the 22 daily newspapers on 15 September 2000. This notified the commencement of Formal Hearings on 16 October 2000 and advised of the publication of scheduling details on the Commission's website. It also recorded the availability of guidelines for submissions from the Commission office.

To facilitate communication with Interested Persons, the Commission used electronic technology extensively. An email distribution list was established and utilised in nearly all aspects of the Commission's interaction with Interested Persons. The Commission website was established as the primary source of documentation including Formal Hearing schedules, Interested Person submissions and witness briefs and, later, transcripts of the proceedings.

Additional notification of Formal Hearing process

Following feedback on the initial Notification, the Interested Person submission and hearing process was revised and fine-tuned by a 'Supplementary notification to Interested Persons' (Supplementary notification) released on 29 September 2000.

Among other things, the Supplementary notification advised that the Commission would accept collaborative submissions and/or presentations by submitters seeking to advance a similar viewpoint, in particular where this would lead to economies in the overall presentation time.

As the deadline for receipt of Interested Person submissions drew closer, the Commission clarified a number of aspects of the submission and hearing process through informal notifications to all Interested Persons, primarily by email. These notifications addressed issues such as the provision of CVs for witnesses presenting evidence in support of submissions, the availability of written submissions on the Commission website, and the availability of video-conferencing facilities for those wishing to present international witnesses to the Commission in its Wellington Formal Hearings venue.

Interested Person written submission process

The initial deadline for Interested Person written submissions and witness briefs was 25 September 2000, applying to those appearing in the first week of Formal

Hearings. This equated to 15 working days prior to their appearance before the Commission.

The Commission's intention was to publish the submissions and witness briefs on its website 10 working days prior to the start of the week in which the Interested Person was scheduled to appear. In addition, submissions were emailed directly to all Interested Persons as soon as available.

As at 30 October 2000, the final deadline for all Interested Person submissions, 105 had been received. A formal extension was given to the remaining organisations.

A small number of Interested Persons subsequently withdrew from the Formal Hearing process, citing a range of reasons including that their interests were adequately represented by other Interested Persons. Some of these organisations, however, provided written submissions through the general public submission process.

A few Interested Persons provided written submissions but declined the opportunity to present to the Commission.

Overall, of the 117 organisations that had been accorded Interested Person status, 107 filed written submissions for the Formal Hearing process.

Formal Hearings venues, dates and times

The hearings room was located on the 11th floor of Dalmuir House, 114 The Terrace, Wellington, where the Commission secretariat was housed. The standard sitting hours were Monday to Thursday, 9.30 am to 5 pm.

A public notice was placed in the 22 daily newspapers on 2 September 2000 advising the location, time and commencement date of the Formal Hearings.

As a result of delays in the completion of the 11th-floor facilities, the first week of hearings was held in the Quality Inn Hotel's Challenge Hall, Willis Street, Wellington.

Formal Hearings were also held in Auckland, on 13 November 2000 and 15-16 February 2001 (Auckland District Court) as well as in Christchurch on 23 February 2001 (Grand Chancellor Hotel).

Most Interested Persons introduced their presentation and conducted cross-examination, by an officer, member or other representative of the particular organisation, but some were represented by counsel.

During the Formal Hearings, a number of overseas witnesses, who were unable to attend the hearings in person, presented by video or telephone conferencing.

Presentations in Maori

In its first notification to Interested Persons, the Commission indicated that it would accept written submissions and oral presentations in Maori during its Formal Hearing process. The Commission, however, requested advance notice of the intention to present in Te Reo in order to enable the provision of translation services.

There was one presentation in Te Reo.

Evidence recording

The Formal Hearings were recorded by audiotape and stenotype. By virtue of simultaneous computer-assisted transcription, the Commissioners were able to view the transcription on their laptop computers. The transcript was posted on the Commission's website.

Public and media attendance

Public notifications and news releases invited members of the public and media to attend the proceedings. Public attendance waxed and waned, depending on the Interested Persons being heard.

The Commission informed media of the proceedings regularly. Representatives of Radio New Zealand and *The Dominion* were in attendance each day. The Formal Hearings received almost daily coverage in national print and radio media.

Summary of the Formal Hearings

Opening statements by the Commission and its legal counsel

The Formal Hearings began on 12 October 2000 with an opening statement (the Statement) made by counsel assisting the Commission, outlining the task of the Commission and how it might achieve this, as provided in its Warrant. The Statement discussed the environment in which the Commission was conducting its inquiry, including reference to the Treaty of Waitangi and New Zealand's relative geographical isolation.

It also outlined the types of information and considerations the Commission would have to take into account, including scientific and technical information, legal matters, commercial interests, and cultural and ethical viewpoints. Furthermore, the Commission was to have regard for the inherent complexities of such information, including the differing attitudes people had to different aspects or applications of the technology.

The Statement concluded by outlining the role of counsel assisting and clarified the cross-examination process.

On behalf of the Commission, the Chair also delivered an opening statement. He emphasised the importance of the Commission completing its work in a timely way and, therefore, the need for cooperation from all parties in the conduct of the Formal Hearings.

On 26 February 2001, at the beginning of the Formal Hearings of Interested Persons representing Maori, the Commission made additional opening remarks. Following a mihimihi by the Commission kaumatua, Pihopa Kingi, the Chair outlined the Commission's process for consulting with Maori.

Copies of these opening statements were posted on the Commission's website.

Oral presentation of submissions

Over the course of 12 weeks, the Commission heard presentations from 107 Interested Persons.

A number of these presentations were on a collaborative basis where organisations representing the same sector, or with like interests, provided joint submissions and/or joint presentations.

Such collaborations included Interested Persons representing the meat industry (including Meat New Zealand, Meat Industry Association of New Zealand and New Zealand Game Industry Board), a joint submission and presentation by New Zealand Vegetable and Potato Growers' Federation, New Zealand Fruitgrowers' Federation and New Zealand Berryfruit Growers' Federation; and another by New Zealand Feed Manufacturers Association, Egg Producers Federation of New Zealand and Poultry Industry Association of New Zealand.

New Zealand Life Sciences Group, an umbrella group for national organisations which are involved, or have an investment in, research or the application of biotechnology, cooperated with some of its member organisations that had obtained Interested Person status, through the joint presentation of witnesses.

The Commission also heard collaborative submissions from those representing the organics industry, six of such organisations working together throughout the proceedings, both in cross-examination and in their presentations. The Commission heard from these organisations over three days of hearings, in early December 2000, with two groups presenting consecutively in the morning (including presenting witnesses drawn from the whole group) and then facing cross-examination as a panel at the conclusion of the presentations.

The Commission accepted this approach as it was in line with it objective to use the available hearing time efficiently and avoid duplication of information.

Cross-examination of Interested Persons

In nearly all instances, the evidence presented by Interested Persons in the Formal Hearings process was subject to cross-examination by other parties, by leave of the Commission.

In establishing its procedures at the outset of the hearings, the Commission indicated it would allocate the available time equally among those seeking to cross-examine. It also encouraged Interested Persons holding the same, or a similar view, to work together to utilise the hearing time more effectively and reduce repetition among Interested Persons with similar viewpoints.

The Commission did not, at any stage in the proceedings, exercise its discretion to decline an application for leave to cross-examine. In many cases, however, cross-examination was limited by the time available.

Additional hearings

The Commission had authority to invite individuals or organisations to appear to present information to assist the Commission in its considerations.

The Commission invited the Australia and New Zealand Food Authority (ANZFA) to appear on 8 March 2001, to provide information on its processes and to respond to the comments and criticisms that had been made during the Formal Hearings. Notification of the additional hearing was given to all Interested Persons who were invited to apply for leave to cross-examine the ANZFA witnesses. As with an earlier hearing at which Environmental Risk Management Authority (ERMA) presented, the ANZFA hearing was extended to accommodate cross-examination.

Copies of ANZFA's written submission (prepared as a general public submission) and its written response to criticism were posted on the Commission's website.

New and rebuttal evidence

By means of a 'Second supplementary notification' issued on 18 December 2000, the Commission announced its procedure for new and rebuttal evidence at the conclusion of the presentations by all Interested Persons. This notification also referred to the process for closing and legal submissions. A 'Third supplementary notification' on 21 February 2001 advised that any new or rebuttal evidence would be heard on 9 March 2001.

New evidence was defined as "evidence that constitutes a significant matter that has arisen since the Interested Person first presented to the Commission, and must be information that was not available, nor could have reasonably been found out, at the time the Interested Person appeared before the Commission".

Rebuttal evidence was defined as "evidence that could not have reasonably been foreseen and presented in the original appearance before the Commission".

In each instance, the Commission would consider applications for leave to address such evidence, on a case-by-case basis. Any new or rebuttal evidence would be subject to cross-examination, at the Commission's discretion.

The Commission received four applications to present new evidence and accepted none. There were eight applications to present rebuttal evidence of which one was accepted.

The notifications were placed on the Commission's website, together with the successful application for leave to present rebuttal evidence.

Closing and legal submissions

As indicated in the initial notification, the Commission invited Interested Persons to make succinct closing submissions at the end of the Formal Hearing process. The Notification indicated that closing submissions could be a summary of the Interested Person's own position; a critique of other submissions; or both. The proviso was, however, that these submissions would not be a repetition of material the Commission had previously heard.

Written closing submissions were not to exceed 10 pages in length, unless by prior arrangement, and were to be filed by 9 March 2001.

In addition, the Commission invited Interested Persons to prepare legal submissions on specific aspects of the Warrant, such as legal liability for loss or damage caused by genetic modification, Treaty of Waitangi issues, international legal or trade issues, or intellectual property law. These, too, were to be filed by 9 March 2001 and, in conjunction with the closing submissions, would be heard in the period 12 to 15 March 2001.

Interested persons provided a total of 17 written closing submissions and six written legal submissions. There were 15 oral presentations, made on behalf of 51 Interested Persons altogether.

Counsel assisting the Commission opened proceedings on 12 March 2001 with a detailed address outlining the process undertaken and some overarching

principles for analysing the evidence, information, arguments and debate presented to the Commission during its Formal Hearing process.

The Commission placed the notifications and the closing and legal submissions on its website.

Conclusion

By the completion of the Formal Hearings, the Commission had heard from some 300 people over a total of 58 days. The hearings produced 4656 pages of transcripts and almost 2 m^3 of submissions and evidence.

In the course of closing remarks by the Commissioners at the end of the Formal Hearing process on 15 March 2001, the Chair said:

> The Commission was directed to consult with the people of New Zealand in a way that allowed them to express their views clearly. We gave a lot of thought to our processes, and received much help from the participants. We have not pleased everyone, and as indeed we have pointed out from time to time, that was neither our intention nor our function. We believe, however, that we have fulfilled the aim we expressed at the outset, to give everyone who wished to present views to us a fair and reasonable opportunity.
>
> As announced at an earlier stage, we decided there were good reasons why the Commission should try to adhere to its reporting date. Thus the time for our public hearings had to be controlled. In fact, we do not believe that either the time limit for presentations or the restrictions on cross-examination, were detrimental to our being well informed. In the event we did not refuse any application to cross-examine outright and had to limit time only occasionally. Participants had to be focused in their presentations, and keep to the main points of their questioning. These factors did not adversely affect either the quality or the quantity of the information conveyed to us. Further, we believe they contributed to a level playing field, since had there been no restrictions, the better resourced participants may have been able to take up an undue share of the hearing time.

Counsel assisting the Commission also made some closing remarks regarding the historical nature of the process and the importance of the resultant report:

> On some occasions reports of Commissions have been pigeonholed. I know that this will not happen, and cannot be allowed to happen, to the report which this Commission will produce.

Copies of the closing statements were placed on the Commission's website.

3.

appendix 1

Context and process

Section contents

3.4 Public Meetings: the process

Introduction

The Commission developed an extensive consultation programme to meet the requirements of its terms of reference (the Warrant).

The consultation programme included the Public Meetings, Hui, Youth Forum and Formal Hearings of Interested Persons.

This paper is a summary of the process involved in conducting 15 Public Meetings throughout New Zealand, from Invercargill to Whangarei, over a five-week period in the last quarter of 2000. An analysis of the information gleaned at these meetings is contained in Appendix 3 (see section 2: "Public Meetings: summary of outcomes").

Regulatory requirements regarding consultation

The Commission was directed to "receive representations upon, inquire into, investigate, and report" on the strategic options and any changes considered desirable to existing regulatory processes regarding genetic modification in New Zealand.

The Warrant also referred to the Commission's consultation process:

> And you are required, in carrying this Our Commission into effect, —
>
> - to consult with the public in a way that allows people to express clearly their views, including ethical, cultural, environmental, and scientific perspectives, on the use, in New Zealand, of genetic modification, genetically modified organisms, and products; and
> - to adopt procedures that will encourage people to express their views in relation to any of the matters referred to in the immediately preceding paragraph; and
> - to consult and engage with Maori in a manner that specifically provides for their needs; and
> - to use relevant expertise, including consultancy and secretarial services, and to conduct, where appropriate, your own research

The manner in which the Commission consulted with the New Zealand public was also influenced by section 4A(1) of the Commissions of Inquiry Act 1908. The Act differentiated between the general public and those who satisfied the Commission they had an interest "above and beyond" that of the general public.

Applications for Interested Persons were sought and some 12 weeks of hearings were allocated to hear them, their witnesses and/or legal counsel. Further details regarding this process are described below (see "Formal Hearings: the process").

The Commission was, however, free to determine the method by which it would consult with the general public.

Interpretation of consultation requirements

The Commission announced its inquiry brief and consultation programme on 7 August 2000, at the opening of its three-day Scoping Meetings, the Commission's first interaction with the New Zealand public:

> The Warrant requires that we consult with the people of New Zealand in a way that allows them to express their views clearly. Some already have strongly held opinions. We expect there will be firm, forthright submissions. Some people feel passionate about the issues. We hope to have a rational, civilised, focused debate. We would like to think this can be achieved notwithstanding the existence of strong or passionate viewpoints. There will be no point in people shouting at one another, or at the Commission. Many have not yet committed themselves to any stance. They are entitled to the opportunity to do so.

The Commission stated that its consultation with the New Zealand public would be "as open as possible, and as inclusive as we can [be], giving everyone who wishes to present their views to us a fair and reasonable opportunity, although not necessarily by way of a personal appearance". It identified the Internet as one tool by which it would achieve these objectives.

The Commission also made it clear that it was working to a deadline of 1 June 2001: "To achieve completion by due date, we will have to limit the time that can be allocated to any one topic, or to any person or organisation. Although there must always be room for flexibility, we will need to adhere to a tight timetable".

The Commission's Opening Statement also acknowledged public concern regarding the definition of Interested Persons and who might contribute to the Commission's inquiry:

> The distinction between so called "interested persons" and the general public is not one the Commission has established. The same law applies to all Commissions of Inquiry and we are bound by it. We assure the public that their voice will be heard. "Interested person"

> may give the wrong impression, we know all of you are really interested, but those happen to be the words of the Act of Parliament.

In addition to assuring the public that "their voice will be heard" despite not being defined as Interested Persons, the Commission indicated that it would "arrange less formal public meetings and consultations in a number of other places".

Establishing a public consultation programme

The Commission's objectives in establishing a public consultation programme were:

- to determine public response to the issues addressed by the Warrant
- to provide an opportunity for 'ordinary New Zealanders' to express their views
- to meet its consultation obligations, as outlined in its Warrant
- to meet its deadline of 1 June 2001
- to provide a human face to a national inquiry
- to be as accessible as possible.

In order to hear the views of members of the public not accorded Interested Person status, the Commission established the following consultation methods:

- Public Meetings
- written submissions
- Hui
- Youth Forum
- Public Opinion Survey.

Establishing the Public Meeting programme

In order to meet the above listed objects, some form of public meeting was identified as the most effective method of consulting with as many New Zealanders as possible within a short time frame.

The Public Meeting programme was designed to assist the Commission in gathering information on the issues outlined in its Warrant in an informal setting. The purpose was, therefore, not to hear submissions but rather to allow the Commission access to the views and opinions of a cross-section of New Zealanders.

To achieve this, a format similar to that used for the Scoping Meetings, held on 7, 8 and 9 August 2000, in Wellington, was used for the Public Meetings. The workshop process using a 'consensus card sort' (see below "Operational detail: Public Meetings: Workshop process") was a proven method for addressing contentious issues, such as genetic modification, and was designed to generate constructive discussion rather than a polarising slanging match.

By combining a workshop with an 'open floor' and 'question time' in its Public Meetings, the Commission was able to gauge the public's views on the issues identified in its Warrant and other issues, as well as determining which of the issues were of most importance within each region.

Following are details of the rationale and process involved in planning the public meeting programme.

Location

As a national commission of inquiry, based in Wellington, the Commission was mindful of the need to consult on a regional basis.

Fifteen regions were identified and public meetings were arranged in the centres that contained the largest population mass and were most accessible from surrounding areas. The Commission was also determined to visit New Zealand's remoter regions such as Southland, the West Coast and Northland.

Meetings were held in the following centres:

- Invercargill — Southland
- Dunedin — Otago and Oamaru
- Christchurch — Canterbury and Timaru
- Greymouth — West Coast
- Nelson — Marlborough and Nelson
- New Plymouth — Taranaki
- Palmerston North — Manawatu
- Wellington — Wellington, Kapiti and Wairarapa
- Hamilton — Waikato
- Rotorua — Bay of Plenty
- Napier — Hawke's Bay
- Gisborne — Gisborne
- Manukau City — Auckland
- Auckland City — Auckland
- Whangarei — Northland.

Some regional centres in which the Commission did not hold public meetings were included in the Commission's Maori Consultation programme.

(For a complete schedule of the Commission's public meetings, see "Operational detail: Public Meetings: Schedule".)

Dates and times

The public meeting programme commenced on 18 September 2000 in Invercargill and concluded on 16 November 2000 in Whangarei. The 15 public meetings were scheduled over a five-week period, during which the Commission commenced its Formal Hearing process on 16 October 2000 and its Maori Consultation programme on 4 November 2000.

To maximise its consultation time in each regional centre and meet its other obligations, the Commission scheduled the Public Meetings for weekdays between 2 pm and 8 pm (except for Greymouth and Whangarei, when meetings were held between 11.30 am and 4 pm and 11 am and 4 pm respectively).

The six-hour meetings were designed to accommodate those who wanted to spend a considerable amount of time with the Commission as well as those who were able to attend only after business hours.

Venues

Venues in which the public meetings were held varied from local theatres to hotel conference rooms. Dependent on the population centre, venue capacity ranged from 50 to 200 people.

Programme

The scheduled public meeting programme is shown on the following page.

Wherever possible, the programme was flexible. Members of the public were welcome to arrive at any time during the six-hour meeting and be included in the process. In addition, participants were able to modify the process: the meeting in Whangarei was extended by an hour to accommodate additional speakers.

Details of each component of the programme are outlined below.

Mihimihi

Local iwi and/or papatipu representatives were invited to conduct a welcome (mihimihi) for the Commissioners and Public Meeting attendees.

Welcome

Local government representatives were invited to attend to welcome the Commission and also chair the 'questions from the floor' segment of the Public

Programme for Public Meetings

Time	Event	Participant
2 pm (Greymouth 11.30 am) (Whangarei 11 am)	Mihimihi Welcome	Local iwi or papatipu representative Local government representative Commission
2.30 pm (Greymouth 12 pm) (Whangarei 11.30 am)	Workshop	Facilitators
5 pm (Greymouth 1.30 pm) (Whangarei 1 pm)	Break	
5.30 pm (Greymouth 2.15 pm) (Whangarei 2 pm)	Workshop report back	Workshop participants
7 pm (Greymouth 3 pm) (Whangarei 3 pm)	Questions from the floor	Chaired by local government representative
7.50 pm (Greymouth 3.50 pm) (Whangarei 3.50 pm)	Closing statements	Local government representative Commission
8 pm (Greymouth 4 pm) (Whangarei 4 pm)	Close	

Meeting. The invitation was extended as acknowledgement of local government involvement in genetic modification regulations and to provide the Commissioners with information on local issues.

The welcome also included an opening statement by the Commission. The statement included reference to the Commission's purpose, the nature of its inquiry and its expectations of the day's proceedings. Commissioners also had the opportunity to introduce themselves and provide a brief outline of their backgrounds and interests.

Workshop

The facilitator introduced the workshop programme, which involved identifying, discussing and recording issues of interest using the consensus card sort process.

Identifying issues to discuss

At the outset of the public meeting programme, participants were asked to respond to questions based on the following eight topic headings:

- human health issues
- consumer choice/labelling issues
- cultural/spiritual issues
- environmental issues
- economic issues
- future use issues
- global development issues
- ethical issues.

The topic headings and questions were based on the Warrant and also the outcomes of the Commission's Scoping Meetings. The questions were made available at the Public Meetings as issue-specific A4 flip charts and a complete list was available as a five-page document. A copy of the 'Public Meetings Questions' document was posted on the Commission website.

The questions were designed to stimulate discussion within the workshop phase of the Public Meetings. In no way were the questions intended to be definitive or indicate any particular viewpoint of the Commission. In addition, participants were invited to identify their own questions.

After the identification of issues, participants were encouraged to select a table at which a topic of personal interest was being addressed. Participants were encouraged to move between tables in order to provide input into more than one issue.

Consensus card sort process

The consensus sort process is a means of encouraging workshop participants to identify, acknowledge and/or understand a variety of opinions surrounding a complex issue. This process provided the Commission with an informed, comprehensive view of issues of interest and concern within a region. The consensus card sort process was also successfully used at the Commission's Scoping Meetings in August 2000.

The consensus card sort process involved four phases and required participants to:

- identify a question from the issue-specific flip chart and then write down their individual response to each question on a separate white card
- collect the white cards on the table and redistribute them to participants at the table
- collate the white cards into piles of similar questions, discuss and write a summary of the content of each pile of collated cards on blue and/or green cards
- write the summarised issues on a large sheet of paper and nominate a participant to report back to the Commissioners on the summary points.

The process was outlined in a one-page document available at the Public Meetings and on the Commission website.

Participants were informed that the information contained on the blue and/or green cards would be recorded on the Commission's website as a summary of the public meeting workshops. Those who left early were requested to hand in their white and coloured cards to the facilitators to ensure their contribution to the workshop was recorded. Dependent on other commitments, Commissioners were in attendance during the workshop process.

Workshop report back

After a half-hour break, the facilitators welcomed newcomers to the meeting and outlined the next phase of the programme. Participants were advised that the following portion of the meeting would be tape-recorded as a reference for the Commission.

Workshop participants were then invited to report back on their discussions to the Commissioners via a nominated representative who utilised the summary sheets for reference. During this phase of the programme, Commissioners were invited to seek clarification and ask questions of the discussions held by the facilitators.

Once all representatives had reported back, the facilitators thanked workshop participants for their efforts and handed over the meeting to the local government representative to chair the next phase.

Questions from the floor

The local government representative, as chair, provided guidelines as to the next phase of the Public Meeting. Dependent on attendee numbers, participants were advised that their speaking time would be limited (often to three minutes) and that preference would be given to those who had not already spoken.

Commission staff involved in public meetings

Two independent contractors were hired to facilitate the workshop component of the public meetings. They were employed for their knowledge of facilitation of large groups, their experience in facilitating meetings on contentious issues and for their understanding of the English and Maori languages and protocol. Both also had previous experience working with the Commission at its Scoping Meetings.

In addition, a representative of the Commission secretariat attended each meeting to assist in the facilitation of the meetings and to provide secretariat support to the Commissioners and general public and media liaison.

Recording of attendees and proceedings

In order to record the views expressed during its public consultation programme, the Commission implemented the following processes for different phases of its public meetings.

Attendees

Public meeting attendees were invited to record their name and addresses on lists placed on each table and at the door. As this was a self-selection exercise, the resultant numbers were not truly indicative of the attendance.

Workshop outcomes

- The white and coloured cards were collected. The contents of the coloured cards (summaries) were transcribed for the Commission and placed on the Commission website.
- The large sheets of paper used for reference by nominated representatives of each table were collected for use by the Commissioners.
- The reporting back phase of the workshops was tape-recorded.

Questions from the floor and general discussion was also tape-recorded.

Advertising and publicity of public meetings

A combination of advertising methods and publicity exercises was utilised to inform the public of the meetings on a national and regional basis.

Notification of the Public Meeting programme (and the Commission's consultation process) first appeared in a nationally distributed news release on 21 August 2000. In addition, a four-column by 22 cm advertisement (in English and Maori) was placed in national dailies on the weekend of 2 September 2000. Further details regarding dates, times and location of public meetings were provided in a nationally distributed news release issued on 12 September 2000.

Information regarding the public meetings was also issued on a regional basis using the following methods:

- *Print advertising*. Advertisements, two-column by 12 cm size, were placed in the public notice section of daily and community newspapers in the immediate area an average of eight to nine days prior to the Public Meetings.
- *Radio advertising*. Thirty-second advertisements were placed on regional radio stations to run every 2.5 hours between 6 am and 6 pm, for an average of three to four days, at least three days prior to the Public Meetings.
- *Street posters*. Because of the four-week lull in the programme, 900 street posters were also utilised to advertise the last three Public Meetings. These A3 and A4 posters were placed on street and shopping-complex locations an average of 14 days prior to the Manukau City, Auckland City and Whangarei public meetings.
- *News releases*. News releases announcing upcoming Public Meetings were distributed to regional and national media by fax and email an average of 16 days prior to the meetings.
- *Media liaison*. Secretariat staff contacted local media by telephone an average of two days prior, to arrange media coverage of Public Meetings.
- *Local government liaison*. Local governments were contacted and requested to place A4 posters on local noticeboards and include details of the Commission's Public Meetings in any local government information material.
- *Website*. The Public Meetings schedule was placed on the Commission website and updated regularly. The website also included information on the programme, the consensus card sort process, the workshop questions and a list of "useful links and sources of reference material".
- *Secretariat*. Details regarding the Public Meeting schedule were available from the Commission office. Information kits regarding the Commission were also available on request.

Media coverage

The Public Meetings received considerable coverage in the national and local print and electronic media before and after the events.

A summary of the proceedings

Attendance at the Public Meetings by various groups of people is outlined below.

Attendance at Public Meetings

Centre	Approximate no. of attendees
Invercargill	15
Dunedin	70
Christchurch	140
Greymouth	30
Nelson	140
New Plymouth	30
Palmerston North	70
Wellington	70
Hamilton	110
Rotorua	60
Napier	70
Gisborne	30
Manukau City	80
Auckland City	140
Whangarei	200

Attendance

Participants

Figures for the number of attendees at the 15 Public Meetings are approximate only. Numbers fluctuated during the meeting.

Invited representatives

Local iwi and papatipu representatives. Mihimihi were conducted by the persons shown overleaf.

Local government representatives. The local government representatives shown overleaf were involved in welcoming the Commissioners and Public Meeting attendees, and chairing part of the meeting.

Commissioners

At least three of the four Commissioners attended each public meeting.

Local iwi and papatipu representatives officiating at Public Meetings

Public Meeting	Iwi/papatipu	Kaikorero
Invercargill	Murihiku Marae	
Dunedin	Otakou Marae	Edward Ellison
Christchurch	Nga Hau e Wha	
Greymouth	Te Runanga o Makawhio	Gary Cogland
Nelson	Tainui Kawa	Barnie Thomas
New Plymouth	Taranaki	Lindsay Macleod, Howie Tamati
Palmerston North	Te Kenehi Teira	Sam Bishara
Wellington	Wellington Tenths Trust	Mark Te One, Morven Simon
Hamilton	Tainui	Haare Puke
Rotorua	Tarawa	Pihopa Kingi
Napier	Te Whanganui-a-Rotu Taiwhenua	Heitia Hiha
Gisborne	Turanga nui a Kiwa	Rutene Irwin
Manukau city	Tainui	Morris Wilson
Auckland City	Ngati Whatua	Matt Maihi
Whangarei	Ngati Wai	Albert Saddler

Modifications to workshop programme

Approximately half way through the Public Meeting schedule, workshop participants elected to identify issues themselves rather than use the eight topic headings provided by the Commission, as listed above. This request was accommodated and the programme adjusted so that participants could identify issues they wished to discuss. These were written down on a white board, segregated into areas of commonality and a table designated for each issue, identified by a piece of card.

Local government representatives at the Public Meetings

Public Meeting	Local government	Representative
Invercargill	Invercargill City Council	Mayor Tim Shadbolt
Dunedin	Dunedin City Council	Deputy Mayor Dame Elizabeth Hanan
Christchurch	Christchurch City Council	Deputy Mayor Lesley Keast
Greymouth	Grey District Council	Cr Doug Truman
Nelson	Nelson City Council	Cr Derek Shaw
New Plymouth	New Plymouth District Council	Cr John Andrews
Palmerston North	Palmerston North City Council	Mayor Jill White
Wellington	Wellington City Council	Cr Sue Piper
Hamilton	Hamilton City Council	Cr Alison Miller
Rotorua	Rotorua District Council	Mayor Grahame Hall
Napier	Napier City Council	Mayor Alan Dick
Gisborne	Gisborne District Council	Cr Simon Cave
Manukau City	Manukau City Council	Cr Neil Morrison
Auckland City	Auckland City Council	Cr Richard Northey
Whangärei	Whangärei District Council	Cr Robin Lieffering

In addition, copies of the Commission's questions were also available to those who requested assistance and prompting with issues they wished to discuss.

The consensus card sort process was also modified during the programme, sometimes to the extent that white cards became 'scribble pads' for ideas and that blue and/or green cards were submitted to the Commission as an individual's statement on genetic modification.

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3.5 Public Submissions: the process

Introduction

In order to consult with the public in a way that allowed New Zealanders to express their views clearly, the Commission invited written submissions from members of the public on the risks and benefits of using genetic modification in New Zealand. The use of public submissions was one of a number of methods used by the Commission to gather public opinion during its inquiry.

More than 10,000 public submissions were received by the closing date of 1 December 2000 and placed on the Commission website. An analysis of their content is included in Appendix 3 ("Analysis of Public Submissions").

Following is an outline of the process involved in receiving public submissions during the inquiry.

Establishing the process

This Commission, as with all commissions of inquiry, was bound by the provisions of the Commissions of Inquiry Act 1908 (the Act), including section 4A(1), *Persons entitled to be heard*.

Section 4A(1) of the Act identifies the situations in which a person is 'entitled to appear and be heard at the inquiry'. These include where a person is 'party to the inquiry' or where a person satisfies the Commission that they have 'an interest in the inquiry apart from that in common with the public'. Following an application process, Interested Persons were required to prepare a written submission and make a presentation to the Commission during its Formal Hearings. Further details regarding the Act and its definition of Interested Persons are contained in this volume ("Formal Hearings: the process").

However, the Commission's terms of reference (the Warrant) required the Commission to consult with the public. Acknowledging that all New Zealanders were interested in the inquiry, the Commission developed an extensive consultation programme that included a series of Public Meetings, Hui, Youth Forum, Public Opinion Survey and written Public Submissions.

In the Commission's opening statement on 7 August 2000, the Chair outlined the submission process and explained the distinction between Interested Person and general public submissions:

> Those not granted "interested person" status under Section 4A(1) will still be entitled to file submissions with the Commission in written form (preferably in electronic format, but typed or handwritten ones will be accepted). Any further participation by such persons is a matter for the discretion of the Commission. We will let them know whether we would like a personal appearance as well, having regard in particular to the help the Commission believes it could receive by hearing that person or body. Such an appearance may involve cross-examination.
>
> Since there has been comment about this, we stress that the distinction between so called "interested persons" and the general public is not one the Commission has established. The same law applies to all Commissions of Inquiry and we are bound by it. We assure the public that their voice will be heard. "Interested person" may give the wrong impression, we know all of you are really interested, but those happen to be the words of the Act of Parliament.
>
> No doubt many people will wish to place written submissions before the Commission. We should like to say now that we will be looking for quality in the submissions, rather than quantity. Repeat submissions, based on a common template, will be identifiable readily enough. The work of the Commission will not be helped by any who try to flood our website in that way. Should that occur, we will not hesitate to make it known publicly.

Invitation to make submissions

Members of the public were invited to make submissions to the Commission by 1 December 2000 via news releases, public notices and at Public Meetings.

The Commission first informed the public of its intention to receive public submissions in a news release issued on 26 June 2000. Additional news releases on 21 August 2000, 31 August 2000, 1 November 2000 and 20 November 2000 reiterated the call for submissions.

An advertisement was placed in national daily newspapers on 2 September 2000. A final call for submissions was made in the public notice section of all daily newspapers on 25 November 2000. In addition, 140 A4-size posters were issued to all Citizen Advice Bureaus in New Zealand on 12 October 2000 to encourage participation in the submission process.

The Commission also called for submissions at the Scoping Meetings on 7, 8 and 9 August 2000 and subsequent Public Meetings and Hui.

Submission guidelines

The Commission issued its Call for Submissions on 31 August 2000. The document included general formatting guidelines and a submission template (referred to as Form 3). A series of topic headings (Form 4) was also provided as guidelines for preparing a public submission. The Call for Submissions stated that submissions that did not follow either of the formats would be accepted.

Public submissions could be in electronic or hard copy (preferably typed rather than handwritten) and emailed or posted to the Commission office by 1 December 2000. The Commission made it clear in its Call for Submissions and in its Opening Statement that repeat or 'form' submissions based on a common template would not be of assistance to the inquiry.

All submitters were requested to provide contact details in the event of being called by the Commission to provide additional material.

Those wishing to make written submissions in Maori were requested to provide an English translation along with their submission. Translations would be independently verified by the Commission.

Reference was also made in the Call for Submissions to the Commission's intention to publish submissions on its website, unless confidentiality was sought. The Commission however reserved the right to refrain from publishing all or any part of a submission.

The Call for Submissions and accompanying forms were available from the Commission website and its office.

Receipt of submissions

Submissions were received by the Commission office from July 2000 onwards. As of 1 December 2000, 10,904 submissions were received from the New Zealand public. The majority of submissions were received from individuals and were of one page or less. Many chose to forward their submissions by email.

A number of organisations, including Government departments, submitted material through the public submission process. Several organisations, including Greenpeace and GE-Free New Zealand, created one-page templates that were filled in, faxed or emailed to the Commission office. Further details regarding the submissions are contained in Appendix 3 ("Analysis of Public Submissions").

A team of Commission staff processed the submissions by date-stamping, entering contact details (where available) into a database, checking for duplications (because many submitters forwarded their submissions via more than one medium) and

issuing identifying numbers. In addition, approximately 30 submissions required translating. The submissions were photocopied and forwarded to an analysis team, another copy was processed for publication on the website by removing submitters' contact details, and the originals were filed.

A selection of 116 submissions was initially placed on the Commission website in December 2000. Following development of an extensive database, a roll-out of the 10,000-plus submissions to be published on the web began in March 2001. The Commission reserved its right not to publish all submissions received on the basis that approximately 500 were illegible, offensive or were form submissions.

Conclusion

In an open letter to the Commission on 30 November 2000 and an accompanying news release, a group of individuals called for an extension of the submission deadline. The Commission responded with a media statement that rejected the allegations made by the group about its consultation processes and reiterated that submissions were required the following day.

In addition, the Commission stated that:

> As a result of its paid advertising and the almost daily coverage by the New Zealand media of the Commission, its activities and the GM debate, the Commission believes the public has been adequately informed of the consultation process and the processes used have fully met the requirements of its terms of reference … We note that many of the signatories to this letter are Interested Persons and have yet to appear before the Commission during its Formal Hearings. They will have ample opportunity to present any points of view on GM that may have been overlooked.

The submissions received from the public have been independently analysed for content and included in the material used by the Commission to form its opinions as outlined in the Report.

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3.6 Maori Consultation programme: the process

Introduction

The Commission's terms of reference (its Warrant) required it to consult widely with the public in a way that allowed people to express clearly their views on the use in New Zealand of genetic modification, genetically modified organisms and products.

The Warrant specified a requirement:

> to consult and engage with Maori in a manner that specifically provides for their needs

Among the matters which the Commission was required to investigate and receive representations upon were the following items:

> (g) the Crown's responsibilities under the Treaty of Waitangi in relation to genetic modification, genetically modified organisms, and products
>
> (j) the main areas of public interest in genetic modification, genetically modified organisms, and products, including those related to —
>
> (iv) cultural and ethical concerns
>
> (k) the key strategic issues drawing on ethical, cultural, environmental, social, and economic risks and benefits arising from the use of genetic modification, genetically modified organisms and products

Thus, besides the Commission's objectives and responsibilities in establishing the public consultation programme, it was also charged with consulting with Maori in a manner that specifically provided for Maori needs and cultural and ethical concerns, and the Crown's responsibilities under the Treaty of Waitangi.

The Maori Consultation programme was one of several options available to Maori to participate in the inquiry. These included Formal Hearings, Public Submissions, a Youth Forum, Public Meetings and a public opinion survey.

This section outlines the process involved in specifically consulting with Maori. Analysis of the outcomes is included in Appendix 3 (see "Analysis of Maori Consultation programme: oral and written submissions from Hui").

Establishing the Maori Consultation Programme

The Commission decided to meet and discuss with Maori the most appropriate methods for conducting a Maori Consultation programme.

Initial hui

With the assistance of the Kaumatua Council of Te Arawa, Bishop Manu Bennett and Te Puni Kokiri, the Commission held an initial hui at Tunohopu Marae, Ohinemutu, Rotorua, on 21 July 2000 to seek input into defining an appropriate consultation process for Maori. Thirty-four people, together with the four Commissioners and Commission officials, attended the hui.

Participants at this scoping hui expressed a desire for independence from government agencies in organisation of the Maori Consultation programme. The Commission noted the outcome of the initial hui and the views expressed and said it would formulate a process with an appropriate time frame and resources.

Maori Consultation programme organisation

After further consideration, the Commission compiled a consultation programme of 28 regional workshops and 10 Regional Hui throughout New Zealand from 24 October 2000 to 10 March 2001, culminating in a National Hui at Turangawaewae Marae, Ngaruawahia, on 6–8 April 2001. An independent consultant was appointed to manage the programme.

The different elements of the Maori Consultation programme had the following objectives:

- The workshops were intended to inform Maori regarding the Commission, its terms of reference and the submission process..
- The 10 Regional Hui were intended to provide a familiar and reasonably accessible venue for Maori to make submissions.
- The National Hui would double as a Regional Hui for the King Country, Waikato and Counties areas and also as a hui which representatives from the 10 completed Regional Hui could attend and korero about the results of the hui in their regions, and so provide a composite view of the results of the Commission's workshop and Regional Hui consultation programme.

The Commission sought to provide as much opportunity as possible for people to attend meetings. Workshops were held from Kaikohe to Invercargill and Regional Hui from Whangarei to Dunedin. Suitable times and venues were discussed with

local iwi organisations and Te Puni Kokiri provided occasional administrative assistance. The complete schedule of workshops and hui is published later in this volume (see "Operational detail: Maori Consultation programme: Schedule of workshops and hui").

Advertising and publicity of Maori Consultation programme

A combination of advertising methods and publicity exercises was used to inform Maori of the workshops and hui on a national and regional basis.

Notification of the Maori Consultation programme was first made in a nationally distributed news release to media on 4 October 2000. Regionalised advertisements were placed in national dailies from 18 October 2000. In addition, a series of three radio advertisements with localised content was aired on Maori radio stations from 17 October 2000.

A panui (in English and Maori) was faxed directly to iwi organisations, marae, and specialist Maori, community and metropolitan media throughout New Zealand on 10 October 2000. The panui was alson placed on the websites of the Commission and Maori organisations.

Localised reminder 'posters', panui and news releases were issued to community and Maori media, iwi organisations and marae by fax and/or email in the weeks immediately preceding the Regional Hui to augment the advertising campaign. These were followed up with phone calls to local media by Secretariat staff.

The workshops and hui received media coverage in local community and metropolitan newspapers and on radio and television stations both before and after the events.

Workshops

The workshops focused on providing information on the role and tasks of the Commission and how, where and when to make a submission to it.

The workshop programme consisted of:

- mihimihi
- description of the role and work of the Commission
- description of how to make a written and/or oral submission to the Commission
- description of how a Regional Hui with the Commission would operate
- provision of an information pack on genetic modification

- presenting an Environmental Risk Management Authority video providing a Maori perspective on genetic modification issues
- discussion of the submission process.

Although some information on genetic modification was made available at the workshops (by way of an information pack containing the Commission's background papers on the subject), it was made clear that emphasis would be placed on imparting information about the Commission and the submission process, rather then educating attendees about genetic modification or debating the issues. Where time permitted, however, discussion was encouraged to help formulate and coordinate ideas for a possible submission to the Commission.

The workshops were of approximately two hours' duration and preceded the Regional Hui in the area. For example, before the first Regional Hui in Wanganui on 4 November 2000, workshops were held at Palmerston North, Wanganui and New Plymouth on 24, 25 and 26 October 2000, respectively. Attendance number varied from four (Kaikohe) to over 30 (Te Kuiti).

Regional Hui

All except one of the 10 Regional Hui (from Whangarei to Dunedin) were marae-based and attended by at least three Commissioners. Formal marae protocol was observed in all cases and the Commission was accompanied to all the Regional Hui, except one, by Te Arawa kaumatua and kuia, Pihopa Kingi and Inez Kingi. Officials attending included an interpreter.

Each Regional Hui was conducted over one day and provided a formal channel in a marae setting for Maori to present oral and/or written submissions directly to the Commission. Most of the Regional Hui were held on Saturdays.

The regional hui programme consisted of:

- powhiri
- statement by the Commission on its purpose and inquiry process
- description of the day's agenda and process
- submissions (oral and written) to the Commission
- selection of representatives from the hui to attend the National Hui
- closing statement by the Commission.

All the Regional Hui were chaired by a member of the local community.

Each submitter was allocated 15 minutes to make a submission. All oral submissions were taped (except where submitters requested that they be not) to

form part of the Commission's records. Submitters were able to make presentations in English or Maori. Most submitters greeted the Commission in Maori and made their main presentation in English. Submissions made in Maori were translated simultaneously for the Commission.

People who had prepared written submissions in most cases presented them orally as well.

Written submissions ranged from a substantial number of typed pages to single-sheet handwritten notes, and some were notes for oral submissions.

Submissions and views were presented by a range of groups and individuals, including national Maori organisations, Maori doctors and health practitioner groups, iwi organisations, rangatahi groups, university lecturers, specialised Maori organic food groups, Maori lawyers, land trusts, and individuals (Maori and non-Maori).

The marae-based hui format and the presence of the Commission at all Regional Hui provided Maori with an accessible, familiar, open, free-flow forum to present their submissions, written or oral, directly to the Commissioners, kanohi ki te kanohi.

National Hui

The National Hui was held at Turangawaewae Marae, Ngaruawahia on 6–8 April 2001. The Commission provided funding for travel and marae accommodation for two representatives from each of the 10 Regional Hui to attend the National Hui.

The National Hui doubled as a Regional Hui for the King Country, Waikato and Counties region. A major part of the National Hui was spent hearing submissions from those areas. Representatives from the other 10 Regional Hui were allotted time to speak during the formal part of the hui but only after the local submissions had finished.

On the evening of 7 April, many of those attending the hui continued to meet and korero among themselves without the Commission members present. At the next hui session on the morning of Sunday, 8 April, the group presented 16 recommendations on genetic modification to the hui. The hui endorsed these recommendations and then presented them to the Commission.

These recommendations are reported in full in Appendix 3.

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3.7 Youth Forum: the process

Introduction

The Commission sought to consult directly with youth as the outcomes of its inquiry would particularly impact on this group of New Zealanders.

A one-day forum was held at Te Papa Tongarewa (Te Papa, Museum of New Zealand) in Wellington on 5 March 2001 for this purpose. The Youth Forum was one of several consultative programmes used by the Commission during its inquiry and outlined within this volume.

The forum was open to 100 youth (those aged 12 to 25, as defined by the Ministry of Youth Affairs). To encourage national participation in this event, the Commission paid for 20 people, aged 16 to 18, to travel to Wellington to attend the forum. Selection was based on responses to a short essay competition. A total of 99 young people attended the forum.

The forum was tape-recorded and a transcript placed on the Commission website. A summary of the resultant discussion is included in Appendix 3 (see "Youth Forum: summary of outcomes").

Establishing the forum

In order to meet the Commission objective of consulting with youth in a manner appropriate to their needs and interests, the following aspects were considered: venue, date and time, publicity and advertising, registration, programme of the event, recording the event.

Venue

The Youth Forum venue was chosen on the basis of its geographic centrality and interest to youth. As the national museum of New Zealand, Wellington's Te Papa also contained historical and cultural material relevant to the genetic modification debate.

Date and time

Monday, 5 March 2001, was selected to accommodate the Commission's commitments to other consultation programmes. The forum was held between

10 am and 3.30 pm (times chosen to suit participants travelling to and from Wellington by aeroplane).

Publicity and advertising

Information packs containing a covering letter, registration forms and posters were sent to all secondary schools, regional and city councils and Interested Persons on 17 January 2001 advising of the Youth Forum and competition. A news release was also distributed to national, regional, education and youth media on the same day. The Youth Forum received considerable publicity in the print media in the month prior to the forum. Details about the forum and competition were also placed on the Commission website. In addition, 3100 A3-size posters were also placed in 13 regional centres (in cafes, schools, cyber zones, skate shops, record stores and video parlours) from 3 February 2001.

Registration

Because of the size of the venue and to encourage discussion, the number of participants was limited to 100. Youth were requested to register their interest in attending and the first 80 applications received were accepted.

In addition, the Commission conducted a national essay competition to select 20 youth, aged 16 to 18, from outside of Wellington to attend the forum. The Commission paid the transport costs of these 20 young people.

Youth were invited to write 500 words on the topic: "What future does genetic modification have in New Zealand?" Entrants were encouraged to discuss the technology's medical, agricultural, food, research, cultural, ethical and environmental risks and benefits.

Almost 200 competition entries and attendance registration forms were received by the deadline of 5 pm, 12 February 2001. Letters of acceptance and information packs were sent to the 100 successful applicants and essay winners on 16 February 2001 advising them of the forum programme and containing background information on the Commission and its processes. Information contained in the kit was also placed on the Commission website. A news release detailing the outcome of the registration process was also distributed on that day.

Programme of the event

The Youth Forum programme was designed to maximise the time available and encourage feedback to the Commission regarding young people's opinions and views on the risks and benefits of utilising genetic modification in New Zealand.

The programme was also designed to reflect the requirements of the participants and was adjusted when needed.

To this end, the majority of the programme incorporated a workshop run by two independent facilitators, experienced in working with youth. The workshop commenced with a role-playing exercise to encourage participants to consider additional points of view on genetic modification, a brainstorming session to identify issues for discussion and a feedback session at its conclusion.

Before starting the workshop, the Commission and its kaumatua and Te Papa's kaihatu welcomed participants to the forum. And at the conclusion of the event, the Commission kaumatua closed the day with a prayer.

Attendees were also given the choice to tour Te Papa or view a video on genetic modification technology. The majority chose to spend 30 minutes on a self-guided tour based on a tour map that asked questions on genetic modification in relation to exhibits on levels 2 and 4 of the museum.

Youth Forum timetable

10 am	Welcome by Commission
10.15 am	Introduction to programme by facilitator
10.30 am	Tour of Te Papa (optional)
11.10 am	Role-play
11.45 am	Brainstorming to identify topics for discussion in workshop
12 pm	Lunch
12.45 pm	Workshop
1.45 pm	Report back and discussion
3.15 pm	Wrap-up of discussion and farewell
3.30 pm	Conclusion

Recording the event

All segments of the Youth Forum, excluding the Te Papa tour, were tape-recorded and transcribed. Participants also had the opportunity to write their views on a large 'graffiti board' and their workshop discussions itemised on wall charts. Feedback on the forum was also sought and recorded by the facilitators.

Attendance at the event

Competition winners

An independent judge selected 20 winning entries on the basis of the depth of thought and concern about the issues of genetic modification. The Commission paid for winners to travel from Auckland (five), Christchurch (three), Dannevirke (one), Dunedin (two), Hastings (one), Hamilton (two), Napier (one), Pukekohe (one), Taupo (two), Wanganui (one) and Whangarei (one) to attend the forum and have lunch with the Commissioners. The winning essays were posted on the Commission website.

Participants

The average age of participants was 17.3 years. At the time of registration, these participants indicated an interest in discussing (in order of priority) environmental, human health and medicine, future uses, global development, consumer choice, ethical, economic and cultural and spiritual issues at the forum.

The Wellington, Hutt Valley, Kapiti Coast, Wairarapa, Manawatu and Marlborough regions were well represented at the forum. Participants also travelled from Napier, Auckland and Tauranga to attend, at their own expense.

Ninety-nine of the 100 registered participants attended the Youth Forum. The four Commissioners, the Commission kaumatua and two Commission staff were in attendance on the day. Representatives of the print and electronic media also attended.

Assessing the event

In the Commission's opening address, the Chair outlined the objective of the Youth Forum:

> We decided we should have a special opportunity to hear the views of the youth of New Zealand … the issues involved in the Commission are of importance to all people in New Zealand.

> Many people would say that they have a special stake in the debate. The decisions that are ultimately made by Government following our report may impact on their business and may affect it for better or for worse. In some cases, their jobs may be affected, they may have to go overseas to continue the same line of research or work if GM should be banned, for example, so I don't want to say that any section of the community has more to gain or lose than another.
>
> Certainly the youth of this country has an important place in the debate. After all, you will have to live with the outcome for longer than other people, so we decided to have a Youth Day. Today, we would like to find out what particular issues are of importance to you in this debate and what your views are on them, how you feel about them.

The information presented to the Commission was informative yet differed from that presented at other consultative programmes in the priority given to issues. In his concluding remarks, the Chair made the observations:

> I think my overwhelming impression of today is that it's been a very well-informed discussion. We've heard many discussions in many different forms over the past six months … and if I may say so, without trying to flatter you … you are better informed on the subject than the previous generation is.
>
> … some of the really difficult questions that have popped up you have found difficult too. I suppose, in one sense, that's a comfort to us. The questions that you thought were really important are the ones that have emerged as being important in the wider discussions we have heard.
>
> It's interesting to me that you have actually ranked them in the different order or priority than the previous generation has done, and we'll have to think about that and see what that proves to us.

Participants indicated that they would have liked to have had more time to discuss the issues. However, based on the feedback received by the facilitators, the forum achieved the objective of hearing youth's views on genetic modification.

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3.8 Public Opinion Survey: the process

Introduction and objectives

As part of the process of conducting the Commission, the Commissioners have consulted widely with various interested parties, including members of the general public. However, in order to ensure the opinions of the general public were fairly canvassed in a representative way, the Commissioners decided to commission a public opinion survey.

The survey was conducted by BRC Marketing & Social Research. Key findings of the survey are presented in Appendix 3 (see "Analysis of Public Opinion Survey"). The process for conducting the survey is described below.

The specific objectives of this survey were to measure the following:

- the awareness (both unprompted and prompted) of genetic modification (in the context of it being an issue of importance to New Zealand)
- an understanding of genetic modification
- perceptions of the extent to which genetic modification is already used in New Zealand, across a range of areas or categories (commercial crops, farm animals, pest control, processed foods, medicines and vaccines, research using plants, research using animals, medical research)
- perceptions about the advantages and disadvantages of genetic modification in relation to each of these categories
- approval or disapproval of genetic modification in relation to each of these categories
- overall perceptions of how much genetic modification has to offer New Zealand
- the extent to which the general public believe themselves to be informed about genetic modification
- the extent to which genetic modification is an issue of personal importance
- belief about the importance to New Zealand's future of the use of genetic modification

Method

This survey was completed between 22 March and 8 April 2001 by telephone, with a nationally representative sample of 1153 New Zealanders, 15 years of age and over.

Maori were over-sampled to ensure the reporting of the results for this population group could be undertaken with confidence. Maori were given the opportunity to be interviewed by a Maori interviewer. A total of 238 Maori were interviewed.

A 'weighting' procedure at the analysis stage rebalanced the sample by ethnicity to ensure that any results based on the total sample were correctly representative. Any result based on the total weighted sample is subject to a maximum error margin of plus or minus 2.9%, at the 95% confidence level. Margins of error for sub groups of respondents are greater and are noted where necessary.

Prior to the interviewing commencing, a general introductory letter referring to a survey about a social issue of importance to New Zealand was sent by BRC to all prospective respondents, to help maximise the response rate. The Commission was not identified as the sponsor of the survey, in the letter or at any stage during the interview. However, if respondents requested, they were told that the survey was commissioned by the Royal Commission at the end of the interview.

Key results of the survey are presented Appendix 3 (see "Analysis of Public Opinion Survey"). Supplementary information is provided in three appendices to the Public Opinion Survey: *Public Opinion Survey: Tabular results*, which contains tabular results for all questions by key demographic variables, including age, gender, ethnicity, occupational status, employment, etc, and *Public Opinion Survey: Verbatim comments*, which contains verbatim comments relating to all open-ended survey questions and summary of results by demographic description. These documents are available on the Commission website.

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4.1 Terms of reference (the Warrant)

Extract from *New Zealand Gazette*, 11 May 2000, No. 49, p. 1072

Royal Commission on Genetic Modification

Elizabeth the Second, by the Grace of God Queen of New Zealand and Her Other Realms and Territories, Head of the Commonwealth, Defender of the Faith:

To The Right Honourable Sir THOMAS EICHELBAUM, G.B.E., of Wellington, formerly Chief Justice of New Zealand; JACQUELINE ALLAN, of Auckland, medical practitioner; JEAN SUTHERLAND FLEMING, of Dunedin, scientist; and the Right Reverend RICHARD RANDERSON, of Auckland, Bishop of the Anglican Church:

GREETING:

Appointment and order of reference

KNOW YE that We, reposing trust and confidence in your integrity, knowledge, and ability, do, by this Our Commission, nominate, constitute, and appoint you, The Right Honourable SIR THOMAS EICHELBAUM, JACQUELINE ALLAN, JEAN SUTHERLAND FLEMING, and The Right Reverend RICHARD RANDERSON, to be a Commission to receive representations upon,

inquire into, investigate, and report upon the following matters:

(1) the strategic options available to enable New Zealand to address, now and in the future, genetic modification, genetically modified organisms, and products; and

(2) any changes considered desirable to the current legislative, regulatory, policy, or institutional arrangements for addressing, in New Zealand, genetic modification, genetically modified organisms, and products:

Relevant matters

And, without limiting the order of reference set out above, We declare that, in conducting the inquiry, you may, under this Our Commission, investigate and receive representations upon the following matters:

(a) where, how, and for what purpose genetic modification, genetically modified organisms, and products are being used in New Zealand at present:

(b) the evidence (including the scientific evidence), and the level of uncertainty, about the present and possible future use, in New Zealand, of genetic modification, genetically modified organisms, and products:

(c) the risks of, and the benefits to be derived from, the use or avoidance of genetic modification, genetically modified organisms, and products in New Zealand, including —

  (i) the groups of persons who are likely to be advantaged by each of those benefits; and

  (ii) the groups of persons who are likely to be disadvantaged by each of those risks:

(d) the international legal obligations of New Zealand in relation to genetic modification, genetically modified organisms, and products:

(e) the liability issues involved, or likely to be involved, now or in the future, in relation to the use, in New Zealand, of genetic modification, genetically modified organisms, and products:

(f) the intellectual property issues involved, or likely to be involved, now or in the future, in relation to the use in New Zealand of genetic modification, genetically modified organisms, and products:

(g) the Crown's responsibilities under the Treaty of Waitangi in relation to genetic modification, genetically modified organisms, and products:

(h) the global developments and issues that may influence the manner in which New Zealand may use, or limit the use of, genetic modification, genetically modified organisms, and products:

(i) the opportunities that may be open to New Zealand from the use or avoidance of genetic modification, genetically modified organisms, and products:

(j) the main areas of public interest in genetic modification, genetically modified organisms, and products, including those related to —

  (i) human health (including biomedical, food safety, and consumer choice):

(ii) environmental matters (including biodiversity, biosecurity issues, and the health of ecosystems):

(iii) economic matters (including research and innovation, business development, primary production, and exports):

(iv) cultural and ethical concerns:

(k) the key strategic issues drawing on ethical, cultural, environmental, social, and economic risks and benefits arising from the use of genetic modification, genetically modified organisms, and products:

(l) the international implications, in relation to both New Zealand's binding international obligations and New Zealand's foreign and trade policy, of any measures that New Zealand might take with regard to genetic modification, genetically modified organisms, and products, including the costs and risks associated with particular options:

(m) the range of strategic outcomes for the future application or avoidance of genetic modification, genetically modified organisms, and products in New Zealand:

(n) whether the statutory and regulatory processes controlling genetic modification, genetically modified organisms, and products in New Zealand are adequate to address the strategic outcomes that, in your opinion, are desirable, and whether any legislative, regulatory, policy, or other changes are needed to enable New Zealand to achieve these outcomes:

Definitions

And We declare that, in this Our Commission, unless the context otherwise requires, —

genetic modification means the use of genetic engineering techniques in a laboratory, being a use that involves —

(a) the deletion, multiplication, modification, or moving of genes within a living organism; or

(b) the transfer of genes from one organism to another; or

(c) the modification of existing genes or the construction of novel genes and their incorporation in any organisms; or

(d) the utilisation of subsequent generations or offspring of organisms modified by any of the activities described in paragraphs (a) to (c)

genetically modified organism means an organism that is produced by genetic modification

organism includes a human being

product includes every medicinal, commercial, chemical, and food product that (while not itself capable of replicating genetic material) is derived from, or is likely to be derived from, genetic modification:

Exclusions from inquiry

But We declare that you are not, under this Our Commission, to inquire into the generation of organisms or products using modern standard breeding techniques

(including cloning, mutagenesis, protoplast fusions, controlled pollination, hybridisation, hybridomas and monoclonal antibodies):

Appointment of chairperson

And We appoint you, The Right Honourable SIR THOMAS EICHELBAUM, to be the Chairperson of the Commission:

Power to adjourn

And for better enabling you to carry this Our Commission into effect you are authorised and empowered, subject to the provisions of this Our Commission, to make and conduct any inquiry or investigation under this Our Commission in such manner and at such time and place as you think expedient, with power to adjourn from time to time and from place to place as you think fit, and so that this Our Commission will continue in force and any such inquiry may at any time and place be resumed although not regularly adjourned from time to time or from place to place:

Consultation and procedures

And you are required, in carrying this Our Commission into effect, —

- to consult with the public in a way that allows people to express clearly their views, including ethical, cultural, environmental, and scientific perspectives, on the use, in New Zealand, of genetic modification, genetically modified organisms, and products; and
- to adopt procedures that will encourage people to express their views in relation to any of the matters referred to in the immediately preceding paragraph; and
- to consult and engage with Maori in a manner that specifically provides for their needs; and
- to use relevant expertise, including consultancy and secretarial services, and to conduct, where appropriate, your own research:

And you are empowered, in carrying this Our Commission into effect, —

(a) to prepare and publish discussion papers from time to time on topics relevant to the inquiry; and

(b) unless you think it proper in any case to withhold any evidence or information obtained by you in the exercise of the powers conferred upon you, —

  (i) to include in any discussion papers prepared and published by you all or any of that evidence or information; and

  (ii) to publish or otherwise disclose in such other ways as you think fit all or any of that evidence or information:

General provisions

And, without limiting any of your other powers to hear proceedings in private or to exclude any person from any of your proceedings, you are empowered to exclude any person from any hearing, including a hearing at which evidence is being taken, if you think it proper to do so:

And you are strictly charged and directed that you may not at any time publish or otherwise disclose, except to His Excellency the Governor-General in pursuance of this Our Commission or by His Excellency's direction, the contents or purport of any report so made or to be made by you:

And it is declared that the powers conferred by this Our Commission are exercisable despite the absence at any time of any 1 or any 2 of the members appointed by this Our Commission so long as the Chairperson, or a member deputed by the Chairperson to act in the place of the Chairperson, and at least 1 other member, are present and concur in the exercise of the powers:

And We do further declare that you have liberty to report your proceedings and findings under this Our Commission from time to time if you judge it expedient to do so:

Reporting date

And, using all due diligence, you are required to report to His Excellency the Governor-General in writing under your hands, not later than 1 June 2001, your findings and opinions on the matters aforesaid, together with such recommendations as you think fit to make in respect of them:

And, lastly, it is declared that these presents are issued under the authority of the Letters Patent of Her Majesty Queen Elizabeth the Second constituting the office of Governor-General of New Zealand, dated 28 October 1983[1], and under the authority of and subject to the provisions of the Commissions of Inquiry Act 1908, and with the advice and consent of the Executive Council of New Zealand.

In witness whereof We have caused this Our Commission to be issued and the Seal of New Zealand to be hereunto affixed at Wellington this 8th day of May 2000.

Witness Our Right Trusty and Well-beloved Counsellor Sir Michael Hardie Boys, Principal Knight Companion of Our New Zealand Order of Merit, Knight Grand Cross of the Most Distinguished Order of Saint Michael and Saint George, Principal Companion of Our Service Order, Governor-General and Commander-in-Chief in and over New Zealand.

MICHAEL HARDIE BOYS, Governor-General.

By His Excellency's Command —

HELEN CLARK, Prime Minister.

Approved in Council —

MARIE SHROFF, Clerk of the Executive Council.

NOTICE NO:3050

By Order of Council dated 14 May 2001, the time for reporting was extended to 27 July 2001.

[1] SR 1983/225.

The Warrant in Maori

Translation of Extract from *New Zealand Gazette*, 11 May 2000, No. 49, p.1072

He mea tango mai i *te Kahiti o Aotearoa*, 11/5/2000, Nama 49, wharangi 1072

Te Komihana Tapairu mo Te Kaupapa Whakarereke Ira Momo Whakaheke

Ko Irihapeti te Tuarua, i raro i te Maru o Te Atua, te Kuini o Aotearoa me ana ake Rohe me ana Whenua, te Upoko o Nga Herenga ki Ingarangi, te Kaiwaowao o te Whakapono:

Ki te Tino Honore ki a Ta THOMAS EICHELBAUM, G.B. E.o Te Whanganui-a-Tara, te Kaiwhakawa Matua mo Aotearoa o mua; JACQUELINE ALLAN, no Tamaki-makau-rau, he rata, JEAN SUTHERLAND FLEMING, no Otepoti, he kaiputaiao; me te Kaikarakia a RICHARD RANDERSON, no Tamaki-makau-rau, te Pihopa o te Hahi Mihinare:

KIA ORA

Nga tangata kua tohua me nga whakaritenga

KIA MOHIO MAI KOUTOU, ara, ko matau e whakapono nei, a, e whiwhi whakamanawatanga nei ki to ngakau tapatahi, to matauranga me to pumanawa, kei te mahi matau i tenei, Ta matau Whakaritenga, ki te whakaingoa, te whakatu me te tohu i a koutou, TA THOMAS EICHELBAUM, JACQUELINE ALLAN, JEAN SUTHERLAND FLEMING me te Kaikarakia a RICHARD RANDERSON, kia noho hei Komihana, a, kia whiwhi i nga whakaputanga whakaaro mo, te uiui, te tuhura me te whakatakoto purongo mo nga take e whai ake nei:

(1) nga kowhiringa rautaki kei te watea, kia taea ai e Aotearoa te titiro inaianei me nga ra kei mua ki te Kaupapa Whakarereke Ira Momo Whakaheke, nga mahi whakarereke ira momo whakaheke mo nga kaiao me nga huanga; me

(2) nga rereketanga e whakaarohia ana he pai ki te mahi, e pa ana ki nga ture o naianei, nga whakaritenga, nga kaupapahere, nga whakahaere a-ropu hei titiro ki nga mahi whakarereke ira momo whakaheke, nga mahi whakarereke ira momo whakaheke mo nga kaiao, me nga huanga i roto o Aotearoa:

Nga take e whai panga ana

A, ahakoa kaore he here kei runga i nga whakapuakanga kei runga ake nei, e ki tuturu ana Matau, i a koutou e whakahaere ana i te uiuitanga e ahei ana koutou i raro i tenei, Ta Matau Whakaritenga, ki te tuhura me te whiwhi i nga whakaputanga whakaaro mo enei take, ara:

(a) ki whea nga wahi hei mahi i te mahi nei, te ahua o te mahi me te take mo nga mahi whakarereke ira momo whakaheke, nga mahi whakarereke ira momo whakaheke mo nga kaiao, me nga huanga e whakamahia ana i roto i Aotearoa inaianei:

(b) nga taunakitanga (tae atu ana ki nga taunakitanga putaiao), me nga awangawanga mo te whakamahi i nga tikanga whakarereke ira momo

whakaheke, nga mahi whakarereke ira momo whakaheke mo nga kaiao, me nga huanga, e whakamahia ana i roto i Aotearoa inaianei me nga ra kei mua:

(c) nga morearea me nga painga i pu mai, i te whakamahi, i te pare ranei i nga mahi whakarereke ira momo whakaheke, nga mahi whakarereke ira momo whakaheke mo nga kaiao, me nga huanga e whakamahia ana i roto i Aotearoa, tae atu ana —

(i) ki nga ropu tera ka whai hua mai i nga painga nei; me

(ii) nga ropu tera ka rawakoretia e aua morearea:

(d) nga herenga ture a-taiao a Aotearoa e pa ana ki nga mahi whakarereke ira momo whakaheke, nga mahi whakarereke ira momo whakaheke mo nga kaiao, me nga huanga:

(e) nga here kei roto, nga here tera ka puta ake ranei inaianei, i nga ra kei mua hoki, e pa ana ki te whakamahi i nga tikanga whakarereke ira momo whakaheke, nga mahi whakarereke ira momo whakaheke mo nga kaiao, me nga huanga e whakamahia ana i roto i Aotearoa:

(f) nga take kei roto e pa ana ki nga rawa punenga, tera ranei ka whai panga inaianei, i nga ra kei mua ranei, mo te ahua o te whakamahi i nga tikanga whakarereke ira momo whakaheke, nga mahi whakarereke ira momo whakaheke mo nga kaiao, me nga huanga e whakamahia ana i roto i Aotearoa:

(g) nga kawenga a te Karauna i raro i te Tiriti o Waitangi e pa ana ki nga tikanga whakarereke ira momo whakaheke, nga mahi whakarereke ira momo whakaheke mo nga kaiao, me nga huanga:

(h) nga whakahaere me nga take kei te ao whanui tera ka whai panga ki te ahua o te whakamahi, te whakatiki ranei i te whakamahi a Aotearoa i nga tikanga whakarereke ira momo whakaheke, nga mahi whakarereke ira momo whakaheke mo nga kaiao, me nga huanga:

(i) nga huarahi tera ka watea ki Aotearoa mai i te whakamahi, te pare ranei i nga tikanga whakarereke ira momo whakaheke, nga mahi whakarereke ira momo whakaheke mo nga kaiao, me nga huanga:

(j) nga tino wahi e paingia ana e te iwi e pa ana ki nga tikanga whakarereke ira momo whakaheke, nga mahi whakarereke ira momo whakaheke mo nga kaiao, me nga huanga, a, ka uru atu —

i) te hauora o te tangata (tae atu ana ki nga take biomedical, te tiaki kai me nga kowhiringa e watea ana ki nga kaiutu):

ii) nga take taiao (tae atu ana ki nga take biodiversity, biosecurity me nga take hauora e pa ana ki nga ecosystem):

iii) nga take ohanga (tae atu ana ki nga mahi rangahau me nga mahi auaha, te whakapakari kaipakihi, nga hua ahuwhenua me nga rawa e tukuna ana ki rawahi):

iv) nga take e pa ana ki nga tikanga a-iwi me nga tika:

(k) nga tino rautaki e titiro ana ki nga morearea e pa ana ki nga tika, nga tikanga a-iwi, te taiao, te hapori me te ohanga, tae atu ana ki nga painga e puta ake ana i te whakamahi i nga tikanga whakarereke ira momo whakaheke, nga mahi whakarereke ira momo whakaheke mo nga kaiao, me nga huanga:

(l) nga whakataunga ki te ao whanui e whai panga ana ki nga kawenga e here ana i a Aotearoa ki te ao whanui, me nga kaupapahere o Aotearoa e pa ana ki nga whenua o rawahi me nga mahi tauhokohoko, o nga mahi tera ka mahia e Aotearoa ki te whakarereke ira momo whakaheke, nga mahi whakarereke ira momo whakaheke mo nga kaiao, me nga huanga, tae atu ana ki nga whakapaunga me nga morearea e pa ana ki etahi ake kowhiringa:

(m) te whanuitanga o nga hua, e ahu ake ana i nga rautaki, o nga tikanga whakarereke ira momo whakaheke, nga mahi whakarereke ira momo whakaheke mo nga kaiao, me nga huanga, ara, ka taea te whakamahi, te pare ranei i nga ra kei mua i a Aotearoa:

(n) mehemea he rawaka nga ture me nga whakaritenga e whakahaere ana i nga tikanga whakarereke ira momo whakaheke, nga mahi whakarereke ira momo whakaheke mo nga kaiao, me nga huanga, hei titiro ki nga hua e ahu ake ana i nga rautaki, ara, ki to whakaaro he pai, a mena e hiahiatia ana etahi atu whakarereketanga ki nga ture, ki nga whakaritenga, ki nga kaupapahere, me etahi atu whakarereketanga ranei e hiahiatia ana kia tatu ai i a Aotearoa enei hua:

Nga Tautuhinga

A, e whakapuaki ana Matau, i roto i tenei Ta Matau Whakaritenga, engari koa he rereke te whakahau a te horopaki, —

ko te kaupapa whakarereke ira momo whakaheke, he whakamahi tenei i nga hangarau tatai tikanga i roto i tetahi whare rangahau, ara, he mahi e uru ana —

(a) te whakakoretanga, te whakarautanga, te whakangohetanga, te neketanga o nga momo ira ranei i roto i te kaiora ora; ko tenei ranei

(b) te whakawhititanga o nga ira mai i tetahi kaiao ki tetahi atu; ko tenei ranei

(c) te whakangohetanga o nga ira o naianei, te hanga ira hou ranei me te whakatopu i enei ki roto ki etahi kaiao; ko tenei ranei

(d) te whakamahi i nga whakatipuranga o muri, nga uri ranei o nga kaiao he mea whakangohe ma etahi o nga mahi i whakamaramatia i nga kowae (a) ki (c)

ko te kaiao he mea whakarereke tona ira momo whakaheke, he kaiao tenei na te mahi whakarereke ira momo whakaheke i whakaputa

ka uru atu te tangata ki te kupu kaiao

ka uru ki te kupu huanga, nga mea e whai ake nei; nga huanga rongoa katoa, nga huanga hokohoko, nga huanga matu me nga huanga kai (ahakoa kaore e ahei ana ia ki te whakatauira ira) i pu mai, tera ranei i pu mai i nga mahi whakarereke ira momo whakaheke.

Nga mea ka mahue ki waho i te uiuitanga

Engari e whakapuaki ana matau kaua koe, i raro i tenei Ta Matau Whakaritenga, e uiui i te mahi whakato kaiao, whakato huanga ranei e whakamahi ana i nga hangarau whakatipu (tae atu ana ki te cloning, mutagenesis, protoplast fusions, (controlled pollinations), hybridisation, hybridomas me nga monoclonal antibody):

Te tohu i te tumuaki

A, e tohu ana Matau i a koe, te Honore Matau Ta THOMAS EICHELBAUM hei Tumuaki mo te Komihana:

Te Mana Hiki Hui

A, kia pai ake ai to whakahaere i tenei Ta Matau Whakaritenga kia tatu ai, e whakamanahia ana, e whakakahatia ana koe, i raro i nga wahanga o tenei Ta Matau Whakaritenga, ki te whakahaere i tetahi uiuitanga, tetahi tuhuratanga ranei i raro i Ta Matau Whakaritenga ki te ahua, te wa me te wahi e pai ana ki a koe, a, kei a koe te mana ki te hiki i te hui ia wa, ia wa, mai i tetahi wahi ki tetahi atu e ai ki tau e hiahia ana, a, kia haere tonu ai te mahi a tenei Ta Matau Whakaritenga, a, kia taea ai te timata ano tetahi uiuitanga ahakoa ehara i te mea ka rite tonu te hiki i te hui ia wa, ia wa, mai i tetahi wahi ki tetahi atu ranei:

Mahi whakawhiti whakaaro me nga whakahaere

A, e whakahautia ana koe i roto i o mahi whakahaere i tenei Ta Matau Whakaritenga,

- kia whakahaeretia e koe o mahi whakawhiti whakaaro me te iwi, kia watea ai ratau ki te ata whakamarama i o ratau whakaaro, tae atu ana ki nga tirohanga e pa ana ki te tika, nga tikanga a-iwi, te taiao me nga mahi putaiao, mo te whakamahi i nga tikanga whakarereke ira momo whakaheke, nga mahi whakarereke ira momo whakaheke mo nga kaiao, me nga huanga; a
- kia whakapumautia e koe nga tikanga whakahaere hei whakatenatena i nga tangata ki te whakaputa i o ratau whakaaro e pa ana ki nga take i roto i te kowae o mua atu nei; a
- kia whakawhiti whakaaro koe me te iwi Maori kia tino mohiotia ai kei te tiakina o ratau nei hiahiatanga; a
- kia whakamahia e koe nga pukenga e whai panga ana, tae atu ana ki nga ratonga whakawhiti whakaaro me nga ratonga mahi hekeretari, me te whakahaere i au ake rangahau i nga wa e tika ana:

A, e whakakahatia ana koe, i a koe e mahi ana kia tatu tenei Ta Matau Whakaritenga, —

(a) ki te whakatika me te whakaputa i nga pepa whakawhiti korero ia wa, ia wa mo nga take e whai panga ki te uiuitanga; a

(b) engari koa e whakaaro ana koe he tika ki te pupuri i etahi taunakitanga, etahi parongo ranei i whiwhi koe i a koe e mahi ana i raro i te mana kua tukuna ki a koe, -

  (i) ki te whakauru ki nga pepa whakawhiti korero nau i whakatika, nau

i whakaputa, te katoa, etahi ranei o aua taunakitanga, aua parongo ranei; a

(ii) ki te whakaputa, te mahi ke ranei ki te panui ma etahi atu tikanga e whakaaro ana koe he tika, te katoa, etahi ranei o aua taunakitanga, aua parongo ranei:

Nga wahanga whanui

A, ahakoa kaore he here kei runga i etahi atu o o mana whakahaere ki te whakarongo ki nga take e whakahaeretia ana i tetahi wahi muna, ki te aukati ranei i tetahi tangata mai i o hui, kei a koe te mana ki te aukati i te tangata ahakoa ko wai mai i nga whakahaere, tae atu ana ki nga hui kei reira e tangohia ana nga taunakitanga, mehemea e tika ana tenei ki to whakaaro:

A, tino whakahautia ana, e tohutohutia ana koe kia kaua koe e noho ka whakaputa, ka panui ranei i nga take kei roto i nga purongo, te huarahi ranei e whaia ana e aua purongo, he mea hanga, e mea ana ranei koe ki te hanga, haunga ia ki te Kawana Tianara e ai ki tenei Ta Matau Whakaritenga, ki te whakahau ranei a te Kawana Tianara:

A, e whakapuaki ana matau ko nga mana whakahaere i whakamaua e tenei Ta Matau Whakaritenga, ka taea te whakahaere enei ahakoa kei te ngaro tetahi mema kotahi, etahi mema e rua ranei i tohua ki tenei Ta Matau Whakaritenga meana kei reira te Tiamana, tetahi mema ranei he mea whakarite e te Tiamana hei kawe i tana turanga, me tetahi atu mema, i runga i ta ratau whakaae ki te whakamahi i enei mana whakahaere:

A, i tua atu e whakapuaki ana Matau kei te watea koe ki te whakapurongo i o whakahaere me o kitenga i raro i tenei Ta Matau Whakaritenga, ia wa, ia wa, mehemea ki to whakaaro he pai ki te mahi penei:

Te Ra Whakapurongo

A, ma te whakamahi i nga tikanga mamahi me hoatu e koe tetahi purongo ki te Kawana Tianara, mahau tonu e tuhi, a, kia kaua e tae atu ki a ia i muri i te 1 o nga ra o Hune 2001, mo o kitenga me o whakaaro mo nga take kua whakahuatia i mua atu nei, i te taha o etahi tutohutanga e whakaaro ana koe he tika ki te whakatakoto, e pa ana ki aua take:

A, ko te mea whakamutunga, e whakapuakitia ana enei tapaetanga i raro i te mana o nga Reta Arai a Kuini Irihapeti te Tuarua e whakatu ana i te tari o te Kawana Tianara o Aotearoa, he mea haina i te 28 o nga ra o Oketopa 1983, a, i raro i te mana o, a, e whakataka ana ki nga wahanga o te Ture o te Komihana Uiuitanga 1908, me nga whakamaherehere me nga whakaaetanga o te Kaunihera Whakahaere o Aotearoa.

Hei whakatuturutanga kua tukuna e Matau tenei Ta Matau Whakaritenga, me te Hira o Aotearoa kia whakamaua i naianei tonu ki Te Whanganui-a-Tara i tenei te 8 o nga ra o Mei 2000.

Tirohia Ta Matau Tino Pou me Ta Matau Tumu Korero Kaiwhakatakoto Aroha

a Ta Michael Hardie Boys, Principal Knight Companion of Our New Zealand Order of Merit, Knight Grand Cross of the Most Distinguished Order of Saint Michael and Saint George, Principal Companion of Our Service Order, Governor-General and Commander-in-Chief in and over New Zealand.

MICHAEL HARDIE BOYS, Kawana Tianara.

I raro i tana whakahau —

HELEN CLARK, Pirimia.

I whakaaetia i roto i te Kaunihera —

MARIE SHROFF, Kaituhi o te Kaunihera Whakahaere Kaupapa.

NOTICE NO:3050

4.

appendix 1

Context and process

Contents

4.2 Schedule of Formal Hearings

Schedule of Formal Hearings and Persons appearing before the Commission

The following is a schedule of the Formal Hearings, additional Hearings, Rebuttal and New Evidence, and Closing and Legal Submissions undertaken and presented during the course of the inquiry.

Formal Hearings (weeks 1–12)

Date & location of hearing	In order of appearance before the Commission (counsel, presenter, witnesses)	Appearing for (Interested Person name & no.)	Cross examined by and on behalf of
16 Oct 00 Wgtn	Chris Hodson QC Andrew Glynn Robert MacDonald Naomi Stevens	Aventis Crop Science Pty Ltd [IP14]	Derek Broadmore [IP61, 58, 104, 53, 81] Susie Lees [IP100] Jeanette Fitzsimons [IP83] Sue Kedgley [IP83] Alan Fricker [IP51] Duncan Currie [IP82] Grant Pearson [RCGM]
16 Oct 00 Wgtn	Chris Hodson QC Fergie Sumich Clive Holland Leo Hyde	DuPont New Zealand Ltd [IP1]	Gareth Bodle [IP61, 58, 104, 53, 81] Susie Lees [IP100] Grant Pearson [RCGM]
17 Oct 00 Wgtn	Carrene Campbell James Griffiths Dr Geoff Webber William Stirling Te Aho Murray Parish Helen Atkins	Carter Holt Harvey Ltd & Fletcher Challenge Forests Ltd [IP17] *and* New Zealand Forest Industries Council [IP9] *Joint presentation*	Mr Rautner [IP82, 78] Grant Pearson [RCGM]

Date & location of hearing	In order of appearance before the Commission (counsel, presenter, witnesses)	Appearing for (Interested Person name & no.)	Cross examined by and on behalf of
17 Oct 00 Wgtn	Michael Holm Dr Keith Steel Dr Patricia Harris Dr Kenneth McNatty Dr Phil L'Huillier Dr Derek Woodfield Dr Stephen Goldson	AgResearch [IP13]	Gareth Bodle [IP61, 58, 104, 53, 81] Sue Kedgley [IP100] Jeanette Fitzsimons [IP83] Alan Fricker [IP51] Grant Pearson [RCGM]
18 Oct 00 Wgtn	James Guthrie Dr Michael Dunbier Dr Anthony Connor Dr Gail Timmerman-Vaughan Dr Kevin Davies	Crop & Food Research Ltd [IP4]	Duncan Currie [IP63] Seager Mason [IP61, 58, 104, 53, 81] Sue Kedgley [IP63] Grant Pearson [RCGM]
18 Oct 00 Wgtn	James Guthrie Dr Chris Walter Dr Michael Carson	Forest Research Institute [IP2]	Duncan Currie [IP82]
18 Oct 00 Wgtn	Dr Ian Warrington Dr Richard Newcomb Dr Susan Gardiner Dr Daniel Cohen Dr Louise Malone Dr Susan Muggleston Dr Gavin Ross	The Horticulture and Food Research Institute of New Zealand Ltd (HortResearch) [IP5]	Seager Mason [IP61, 58, 104, 53, 81] Jeanette Fitzsimons [IP83] *heard on 19 Oct 00* Grant Pearson [RCGM] *heard on 19 Oct 00*
19 Oct 00 Wgtn	James Guthrie Dr Andrew Pearce Dr Dianne Gleeson Dr Phil Cowan Roger Wilkinson	Landcare Research [IP12]	Dr Sean Weaver [IP83, 100] Alan Fricker [IP51] Dr Peter Maddison [IP79] Grant Pearson [RCGM]
19 Oct 00 Wgtn	Forrie Miller Dr Allan Freeth Warwick Green	Wrightson Ltd [IP3]	Jeanette Fitzsimons [IP83]
24 Oct 00 Wgtn	Mark Christensen Prof Patrick Sullivan Dr Michael McManus Dr Stephen Sarre	Institute of Molecular BioSciences (Massey University) [IP15]	Jim Kebbell [IP61, 58, 104, 53, 81] Grant Pearson [RCGM]

Schedule of Formal Hearings (continued)

Date & location of hearing	In order of appearance before the Commission (counsel, presenter, witnesses)	Appearing for (Interested Person name & no.)	Cross examined by and on behalf of
	Dr Rosie Bradshaw Prof Barry Scott		
24 Oct 00 Wgtn	Mark Christensen Dr Berridge Dr Nicola Harris	Malaghan Institute of Medical Research [IP10]	Jim Kebbell [IP61, 58, 104, 53, 81] Grant Pearson [RCGM]
25 Oct 00 Wgtn	Chris Hodson QC Prof Marston Conder Assoc Prof Ingrid Winship Prof Garth Cooper Prof Richard Bellamy	University of Auckland [IP16]	Jeanette Fitzsimons [IP83] Grant Pearson [RCGM]
25 Oct 00 Wgtn	Chris Hodson QC Dr Ian Smith Dr Glenn Buchan Dr Parry Guilford Dr Graham Wallis Dr Iain Lamont Assoc Prof Clive Ronson	University of Otago [IP19]	Dr Sean Weaver [IP83] Grant Pearson [RCGM]
25 Oct 00 Wgtn	Chris Hodson QC Brian Arnst Murray Willocks	Monsanto New Zealand [IP6]	Derek Broadmore [IP61, 58, 104, 53, 81] Duncan Currie [IP82, 102] Sue Kedgley [IP83] Susie Lees [IP100] Alan Fricker [IP51] Grant Pearson [RCGM]
26 Oct 00 Wgtn	Prof Roy Bickerstaffe Matthew Kent Dr Jonathan Hickford Dr Barry Palmer Prof Alison Stewart Dr Robin McFarlane Prof Roger Field	Lincoln University [IP8]	Susie Lees & Claire Bleakley [IP100]
27 Oct 00 Wgtn	Dr Andrew Pratt Dr Jack Heinemann	University of Canterbury [IP7]	Grant Pearson [RCGM]

Date & location of hearing	In order of appearance before the Commission (counsel, presenter, witnesses)	Appearing for (Interested Person name & no.)	Cross examined by and on behalf of
27 Oct 00 Wgtn	Jennifer Murphy Dr Arie Guersen Dr Andrew Shenk	Genesis Research & Development Corp Ltd [IP11]	Alan Fricker [IP51] Grant Pearson [RCGM]
30 Oct 00 Wgtn	David Parker	A2 Corporation Ltd [IP26]	Grant Pearson [RCGM]
30 Oct 00 Wgtn	Mark Christensen Dr John Kernohan Prof Peter Gluckman Prof John Mattick	Auckland UniServices Ltd [IP23]	Grant Pearson [RCGM]
31 Oct 00 Wgtn	Mark Christensen Dr Sean Devine Dr Adolf Stoombergen	Association of Crown Research Institutes [IP22]	Duncan Currie [IP82, 102] Derek Broadmore [IP61, 58, 104, 53, 81] Grant Pearson [RCGM]
31 Oct 00 Wgtn	Mark Christensen Dr William Rolleston Basil Wakelin	BIOTENZ [IP25]	Derek Broadmore [IP61, 58, 104, 53, 81] Duncan Currie [IP102] Grant Pearson [RCGM]
01 Nov 00 Wgtn	Chris Hodson QC Dr William Rolleston Paora Ammunson Tamati Cairns Prof Klaus Amman	New Zealand Life Sciences Network (Incorporated) [IP24] *and* New Zealand Vice Chancellors Committee [IP18] *Joint presentation*	Alan Fricker [IP51] Duncan Currie [IP82, 103] Jeanette Fitzsimons [IP83] Ripeke Ellison [IP64] Grant Pearson [RCGM]
02 Nov 00 Wgtn	Dr Bruce Scroggins	Health Research Council of New Zealand [IP27]	Mark Christensen [IP24] Grant Pearson [RCGM]
02 Nov 00 Wgtn	Gowan Pickering Nick Allison Dr Marie Bradley Liz Prendergast	Foundation for Research, Science and Technology [IP21]	Mark Christensen [IP24] Grant Pearson [RCGM]
13 Nov 00 Akld	Derek Keene Hally Toia	Northland Conservation Board [IP68]	Mark Christensen [IP24] Grant Pearson [RCGM]

Schedule of Formal Hearings (continued)

Date & location of hearing	In order of appearance before the Commission (counsel, presenter, witnesses)	Appearing for (Interested Person name & no.)	Cross examined by and on behalf of
13 Nov 00 Akld	Mr Pomare Michael O'Donnell Kay Baxter Bob Corker	Koanga Gardens Trust Incorporated [IP72]	Grant Pearson [RCGM]
13 Nov 00 Akld	Tom Bennion Assoc Prof Peter Wills	*Witness appearing for IP107, 82, 83, 78, 51, 84, 89*	Denys Trussle [IP78] John Carapiet [IP63] Mark Christensen [IP24] Grant Pearson [RCGM]
20 Nov 00 Wgtn	Alan McKenzie Warren Larsen Dr Joan Wright Dr Kevin Marshall Dr John Yeabsley Juliet Maclean Ms Bromley	New Zealand Dairy Board [IP67]	Derek Broadmore [IP61, 58, 104, 53, 81] Tom Bennion [IP 83, 51] Brendan Brown QC [RCGM]
20 Nov 00 Wgtn	Alan McKenzie Ms Bromley Peter Hobman Dr Robert Welch	New Zealand Cooperative Dairy Company [IP88]	Tom Bennion [IP83] Brendan Brown QC [RCGM]
21 Nov 00 Wgtn	Chris Hodson QC Neil Taylor John Miller Ross Townsend Collier Isaacs Rob Davison Brian Lynch Dr Alex Sundakov Julian Morris Prof Martina McGloughlin Robin Campbell	Meat Industry Assocation of New Zealand [IP32] *and* Meat New Zealand [IP31] *and* New Zealand Game Industry Board [IP33] *joint presentation*	Duncan Currie [IP82] Gareth Bodle [IP61, 58, 104, 53, 81] Tom Bennion [IP 83, 51] Brendan Brown QC [RCGM]
22 Nov 00 Wgtn	Chris Hodson QC Dr Jack Richardson Prof Gary Comstock	Agcarm Incorporated [IP29]	Tom Bennion [IP83, 51] Duncan Currie [IP82] Brendan Brown QC [RCGM]

Date & location of hearing	In order of appearance before the Commission (counsel, presenter, witnesses)	Appearing for (Interested Person name & no.)	Cross examined by and on behalf of
22 Nov 00 Wgtn	Chris Hodson QC Alistair Polson Thomas Lambie John Aspinall Neil Barton Peter Corish Malcolm Bailey	Federated Farmers of New Zealand [IP34]	Gareth Bodle [IP61, 58, 104, 53, 81] Duncan Currie [IP82] Tom Bennion [IP83] Brendan Brown QC [RCGM]
23 Nov 00 Wgtn	Chris Hodson QC Prof Bill Manktelow Assoc Prof Richard Squires Jim Guthrie Dr Lynn Frewer	New Zealand Veterinary Association Incorporated [IP28]	Gareth Bodle [IP61 , 58, 104, 53, 81] Sue Kedgley [IP83] Tom Bennion [IP63] Brendan Brown QC [RCGM]
23 Nov 00 Wgtn	Chris Hodson QC Mark O'Grady Dr Maurice Ormsby Hon. David Caygill Dr Alex Sundakov Dr Peter Fennessy	New Zealand Wool Board [IP30]	Tom Bennion [IP63] Brendan Brown QC [RCGM]
27 Nov 00 Wgtn	Chris Hodson QC Brenda Cutress Dr Lawrence Eyres Dr Geoffrey Annison Michael Rosser Dick Hubbard	New Zealand Grocery Marketers Association [IP54]	Tom Bennion [IP83, 61, 58, 104, 53, 81] Brendan Brown QC [RCGM]
27 Nov 00 Wgtn	Chris Hodson QC Dr Hilton Furness Warwick Green Dr Brian Jordan Graham Robertson	New Zealand Arable-Food Industry Council [IP56]	Tom Bennion [IP 51, 61, 58, 104, 53, 81, 83] Brendan Brown QC [RCGM]
28 Nov 00 Wgtn	Colin Harvey	New Zealand Agritech [IP73]	Tom Bennion [IP83] Brendan Brown QC [RCGM]

Schedule of Formal Hearings (continued)

Date & location of hearing	In order of appearance before the Commission (counsel, presenter, witnesses)	Appearing for (Interested Person name & no.)	Cross examined by and on behalf of
28 Nov 00 Wgtn	Chris Hodson QC Mr Foulds Dr Phillip Salisbury	New Zealand Feed Manufacturers Association (Inc); Poultry Industry Association of New Zealand (Inc); Egg Producers Federation of New Zealand [IP35]	Duncan Currie [IP82] Tom Bennion [IP63, 83] Brendan Brown QC [RCGM]
29 Nov 00 Wgtn	Chris Hodson QC Peter Silcock Dr Neil Stewart Dr Steven Hughes Peter Ensor	New Zealand Vegetable and Potato Growers' Federation (Inc); New Zealand Fruitgrowers' Federation (Inc); New Zealand Berryfruit Growers Federation (Inc) [IP75]	Gareth Bodle [IP61, 58, 104, 53, 81] Dr Audrey Jarvis [IP49] Richard Davis [IP49] Duncan Currie [IP82] Tom Bennion [IP83] Grant Pearson [RCGM]
30 Nov 00 Wgtn	*did not appear*	New Zealand Worm Federation [IP94]	
30 Nov 00 Wgtn	Dr Nigel Banks Tony Marks Jane Lancaster	ZESPRI International Ltd [IP46]	Jeanette Fitzsimons [IP83] Tom Bennion [IP63] Chris Hodson QC [IP24] Grant Pearson [RCGM]
04 Dec 00 Wgtn	Derek Broadmore David Wright Dr Ann Clark Jim Kebbell Gareth Bodle Noel Josephson Dr Johannes Wirz	Bio Dynamic Farming and Gardening Association in New Zealand [IP61] *and* Commonsense Organics [IP66] *joint presentation*	Sue Kedgley [IP83] Chris Hodson QC [IP24] Grant Pearson [RCGM]

Date & location of hearing	In order of appearance before the Commission (counsel, presenter, witnesses)	Appearing for (Interested Person name & no.)	Cross examined by and on behalf of
05 Dec 00 Wgtn	Derek Broadmore Seager Mason Gary Goldberg Percy Schmeiser Laverne Aflleck *(by video link)* Jeff Hay Gareth Bodle	BIO-GRO New Zealand [IP58] *and* Golden Bay Organic Employment and Education Trust [IP104] *joint presentation*	Chris Hodson QC [IP24] Susie Lees [IP100] Grant Pearson [RCGM] Jeanette Fitzsimons [IP83] Grant Pearson [RCGM]
06 Dec 00 Wgtn	Gareth Bodle John Manhire Dr Hugh Campbell Dr John Fairweather Prof Caroline Saunders Brendan Hoare Russell Simmons Marty Robinson Zelka Grammer Dr Andy Cook	Organic Product Exporters Group [IP53] *and* Organic Federation New Zealand [IP81] *joint presentation*	Ian Ewen-Street [IP83] Chris Hodson QC [IP24] Grant Pearson [RCGM]
07 Dec 00 Wgtn	Bill Bracks	Comvita New Zealand [IP74]	Jon Muller [IP63] Chris Hodson QC [RCGM] Grant Pearson [RCGM]
11 Dec 00 Wgtn	Assoc Prof Ingrid Winship	Auckland Healthcare Services Limited [IP91]	Brendan Brown QC [RCGM]
11 Dec 00 Wgtn	Terrance Aschoff Dr Gillian Woollett Linda McLaughlan	Researched Medicines Industry Association of New Zealand [IP55]	Francis Wevers [IP24] John Stroh [IP83] Brendan Brown QC [RCGM]
12 Dec 00 Wgtn	Crystal Bridger Prof Bob Elliot Assoc Prof Daniel Thiebaud Dr Ronald Chance Lebuinus Vink	Diabetes Youth New Zealand [IP60]	Dr Sean Weaver [IP83] Brendan Brown QC [RCGM]

Schedule of Formal Hearings (continued)

Date & location of hearing	In order of appearance before the Commission (counsel, presenter, witnesses)	Appearing for (Interested Person name & no.)	Cross examined by and on behalf of
12 Dec 00 Wgtn	Roger Daube Margaret Nicholls	Cystic Fibrosis Association of New Zealand [IP39]	Francis Wevers [IP24] Jeanette Fitzsimons [IP83] Brendan Brown QC [RCGM]
13 Dec 00 Wgtn	Dr Dianne Webster	National Testing Centre [IP44]	
13 Dec 00 Wgtn	John Forman Paul and Jenny Noble Sharon Kortas Assoc Prof Mike Eccles Anita Nicholls Bronwyn Gray Dr Michael Sullivan Dr Dianne Webster	Lysosomal Diseases New Zealand [IP99]	Francis Wevers [IP24] Dr Sean Weaver [IP83] Brendan Brown QC [RCGM]
14 Dec 00 Wgtn	Alan Fricker Prof Brian Goodwin *(by telephone)*	Sustainable Futures Trust [IP51]	Chris Hodson QC [IP24] Brendan Brown QC [RCGM]
14 Dec 00 Wgtn	Michael Carnahan Dion York	Haemophilia Foundation New Zealand [IP48]	Brendan Brown QC [RCGM]
23 Jan 01 Wgtn	Dr Selwyn Yorke Dr Max Kennedy	New Zealand Biotechnology Association [IP47]	Luke Anderson [IP63] Jeanette Fitzsimons [IP83] John Upton QC [RCGM]
23 Jan 01 Wgtn	Dr John Clearwater Dr Bernard Conlon Dr Michael Godfrey Christy Hartlage Dr Neil Macgregor	Physicians and Scientists for Responsible Genetics New Zealand [IP107]	Mark Christensen [IP24] John Upton QC [RCGM]
24 Jan 01 Wgtn	Dr Mike Berridge Prof David Penny Dr Fiona McDonald Dr David Heath	New Zealand Association of Scientists [IP92]	Steven Druker [IP63,100] Luke Anderson [IP83] John Upton QC [RCGM]

Date & location of hearing	In order of appearance before the Commission (counsel, presenter, witnesses)	Appearing for (Interested Person name & no.)	Cross examined by and on behalf of
24 Jan 01 Wgtn	Dr Steve Thompson Rosemary Du Plessis Prof George Peterson	Royal Society of New Zealand [IP77]	Steven Druker [IP63,100] Mark Christensen [IP24] Luke Anderson [IP83] John Upton QC [RCGM]
25 Jan 01 Wgtn	Dr Max Suckling	New Zealand Plant Protection Society [IP36]	Dr Robin Ord [IP87] John Upton QC [RCGM]
25 Jan 01 Wgtn	Dr Don Love Dr Joanne Dixon Dr Andrew Shelling Dr Ingrid Winship	Human Genetics Society of Australasia New Zealand Branch [IP59]	Jeanette Fitzsimons [IP83] Dr Robin Ord [IP87] John Upton QC [RCGM]
25 Jan 01 Wgtn	Dr Martin Kennedy Dr Ian McLennan *(by video link)* Dr Kyoko Koishi *(by video link)*	New Zealand Transgenic Animal Users [IP45]	Sue Kedgley [IP83] Dr Robin Ord [IP87] John Upton QC [RCGM]
26 Jan 01 Wgtn	Ross Wilson Peter Conway	New Zealand Council of Trade Unions [IP95]	Don Murray [IP100] John Upton QC [RCGM]
26 Jan 01 Wgtn	Doug Calhoun Megan Williams Jared Scartlett Jane Calvert	Institute of Patent Attorneys [IP71]	Duncan Currie [IP82] Dr Robin Ord [IP87] Don Murray [IP100] John Upton QC [RCGM]
29 Jan 01 Wgtn	Alison White Dr Judy Carman Dr Robin Ord	Pesticide Action Network New Zealand [IP87]	Don Murray [IP100] Chris Hodson [IP24]
29 Jan 01 Wgtn	Tee Rogers-Hayden Sue Kedgley	Safe Food Campaign [IP86]	Don Murray [IP100] Chris Hodson QC [IP24] John Upton QC [RCGM]
30 Jan 01 Wgtn	John Muller Guy Hatchard Mae-Wan Ho *(by video link)*	GE Free New Zealand (RAGE) in Food and	Chris Hodson QC [IP24] John Upton QC [RCGM]

Schedule of Formal Hearings (continued)

Date & location of hearing	In order of appearance before the Commission (counsel, presenter, witnesses)	Appearing for (Interested Person name & no.)	Cross examined by and on behalf of
	Jon Carapiet Joe Cummins *(by video link)*	Environment [IP63]	
30 Jan 01 Wgtn	Don Murray Alan Saipe Sol Morgan Joe Rifici Steven Druker Susie Lees	Nelson GE Free Awareness Group [IP100]	Chris Hodson QC [IP24] John Upton QC [RCGM]
31 Jan 01 Wgtn	Ron Law	National Nutritional Foods Association of New Zealand [IP106]	Chris Hodson QC [IP24] Grant Pearson [RCGM]
01 Feb 01 Wgtn	Jeanette Fitzsimons Dr Michael Antoniou *(by video link)* Dr Ann Clark *(by video link)* Prof Phil Regal *(by video link)* Dr Elaine Ingham *(by video link)* Dr Scott Eastham Sue Kedgley	Green Party of Aotearoa/New Zealand [IP83]	Dr Guy Hatchard [IP63] Chris Hodson QC [IP24] John Upton QC [RCGM]
01 Feb 01 Wgtn	Barry Foster Jane Lorimer Bill Floyd	National Beekeepers Association of New Zealand, Poverty Bay Branch [IP62]	Chris Hodson QC [IP24] John Upton [RCGM]
07 Feb 01 Wtgn	Dr Cliff Mason Dr Neil MacGregor Dr Joan Mattingley-Cameron Dr Beatrix Tappeser Kay Weir	Pacific Institute of Resource Management [IP84]	John Carapiet [IP63] Chris Hodson QC [IP24] Grant Pearson [RCGM]
07 Feb 01 Wgtn	Denys Trussell Simon Reeves Dr Susan Bardocz	Friends of the Earth [IP78]	John Carapiet [IP63] Chris Hodson QC [IP24] Grant Pearson [RCGM]

Date & location of hearing	In order of appearance before the Commission (counsel, presenter, witnesses)	Appearing for (Interested Person name & no.)	Cross examined by and on behalf of
	Dr Arpad Pusztai Dr Stanley Ewen		
08 Feb 01 Wtgn	Keith Chapple Jocelyn Bieleski Dr Peter Maddison Mr Weeber	Royal Forest and Bird Protection Society of New Zealand (including Marlborough, Nelson/Tasman branches) [IP79, 40, 43] *joint presentation*	Chris Hodson QC [IP24] Brendan Brown QC [RCGM]
09 Feb 01 Wgtn	Stephen Blyth Craig Holdrege (*by video link)* Berylla Luke Anderson	Environment and Conservation Organisations of New Zealand [IP102]	Chris Hodson QC [IP24] John Upton QC [RCGM]
15 Feb 01 Akld	Dr Guy Hatchard Brendan Hoare Meriel Watts Dr Klaus Bosselmann Dr John Clearwater	Soil and Health Association of New Zealand [IP97]	Chris Hodson QC [RCGM] John Upton QC [RCGM
15 Feb 01 *and* 16 Feb 01 Akld	Gary Reese Joyce D'Silva Prof Alan Holland *(by video link)* Dr Michael Morris	SAFE (Save Animals From Exploitation) [IP85]	John Forman [IP99, 98] Chris Hodson QC [IP24] John Upton [RCGM]
16 Feb 01 Akld	Annette Cotter Dr Doreen Stabinsky Dr Bill Christison Prof Terje Traavik Anuradha Mittal *(by video link)* Prof Jonathan King Denys Trussell Stephanie Howard Jim Thomas	Greenpeace New Zealand [IP82]	John Forman [IP99] Chris Hodson QC [IP24] John Upton QC [RCGM]

Schedule of Formal Hearings (continued)

Date & location of hearing	In order of appearance before the Commission (counsel, presenter, witnesses)	Appearing for (Interested Person name & no.)	Cross examined by and on behalf of
19 Feb 01 Wgtn	Dame Margaret Austin Prof Sylby Rumball Nadja Tollemache Susan Isaacs	New Zealand National Commission for UNESCO [IP90]	Chris Hodson QC [IP24] John Upton QC [RCGM]
19 Feb 01 Wgtn	Margaret Millard Liz Mende	Rural Women New Zealand [IP52]	Chris Hodson QC [IP24] John Upton QC [RCGM]
20 Feb 01 Wgtn	Prof Darryl Macer *(by video link)*	Eubios Ethics Institute [IP96]	Chris Hodson QC [IP24] John Upton QC [RCGM]
20 Feb 01 Wgtn	Rev Jim Greenaway Stephanie McIntyre	Anglican Church in Aotearoa New Zealand and Polynesia [IP42]	Chris Hodson QC [IP24] John Upton QC [RCGM]
20 Feb 01 Wgtn	Hugh Scott Richard Davis	Public Questions Committee (Methodist, Presbyterian, Churches of Christ, Quaker) [IP93]	Chris Hodson QC [IP24] John Upton QC [RCGM]
21 Feb 01 Wgtn	David Zwartz Hilary Phillips	New Zealand Jewish Community [IP80]	John Upton QC [RCGM]
21 Feb 01 Wgtn	Dr Audrey Jarvis Dr Grant Gillett Maree Pene Dr Vivienne Burrows	Interchurch Commission on Genetic Engineering [IP49]	Chris Hodson QC [IP99] John Upton QC [RCGM]
22 Feb 01 Wgtn	Jocelyn Thornton Barbara Mountier Hilda Daw Anne Meuli Joanna Paul Peter Harrison	Quaker Spiritual Ecology Group, Religious Society of Friends [IP50]	John Forman [IP24] John Upton QC [RCGM]
22 Feb 01 Wgtn	Bishop Peter Cullinane Anne Dickinson Dr Michael McCabe	New Zealand Catholic Bishops' Conference [IP38]	John Forman [IP99] John Upton QC [RCGM]

Date & location of hearing	In order of appearance before the Commission (counsel, presenter, witnesses)	Appearing for (Interested Person name & no.)	Cross examined by and on behalf of
23 Feb 01 Chch	Rex Verity Simon Musgrave Tremane Barr Tim Chamberlain John Guthrie	Canterbury Commercial Organics Group [IP65]	Mark Christianson [IP24] Duncan Currie [IP82] John Upton QC [RCGM]
23 Feb 01 Chch	Mark Christianson Dr Patrick Moore	*Witness appearing for IP24 and 35,*	Duncan Currie [IP82, 63] John Upton QC [RCGM]
23 Feb 01 Chch	Edward Ellison Tim Rochford Craig Paulin Linda Constable	Te Runanga o Ngai Tahu [IP41]	Tom Christianson [IP24] John Upton QC [RCGM]
26 Feb 01 Wgtn	Maanu Paul Tu Williams	New Zealand Maori Council [IP105]	Chris Webster [IP103] Chris Hodson QC [IP24] John Upton QC [RCGM]
26 Feb 01 Wgtn	Annette Sykes Leonie Pihama Hariata Pohatu Angeline Greensill Cheryl Smith Jessica Hutchins Tere Harrison Ripeka Ellison-Orzecki Dr Fiona Cram	Nga Wahine Tiaki o te Ao [IP64]	Paora Ammunson [IP24] Chris Webster [IP103] John Upton QC [RCGM]
27 Feb 01 Wgtn	Vivienne Taueki	Muaupoko Co-operative Society [IP57]	Chris Webster [IP103] Grant Pearson [RCGM]
27 Feb 01 Wgtn	Tu Williams Chris Webster	Maori Congress [IP103]	Paora Ammunson [IP24] Chris Hodson [IP24] Grant Pearson [RCGM]
27 Feb 01 Wgtn	Paul Morgan Jacob Haronga	Federation of Maori Authorities [IP69]	Paora Ammunson [IP24] Chris Webster [IP103] Grant Pearson [RCGM]

Schedule of Formal Hearings (continued)

Date & location of hearing	In order of appearance before the Commission (counsel, presenter, witnesses)	Appearing for (Interested Person name & no.)	Cross examined by and on behalf of
28 Feb 01 Wgtn	*did not appear*	WAI 262 Claimants, Ngati Wai, Ngati Kuri, Te Rarawa [IP89] *did not appear*	
28 Feb 01 Wgtn	Dr Morgan Williams Dr Mark Lonsdale	Parliamentary Commissioner for the Environment [IP70]	Chris Hodson QC [IP24] Chris Webster [IP103] John Upton QC [RCGM]
01 Mar 01 Wgtn	Marilyn Bramley Dr Lin Roberts Dr Steven Vaughan Tony Robinson Dr Abdul Moeed	Ministry for the Environment [IP101]	Chris Hodson QC [IP24] Pat Clark [IP63, 83] Susie Lees [IP100] Chris Webster [IP103] John Upton QC [RCGM]
01 Mar 01 *and* 02 Mar 01 Wgtn	Dr Bas Walker Dr Oliver Sutherland Dr Mere Roberts Dr Donald Hannah Mr K Currie	Environmental Risk Management Authority [IP76]	Chris Hodson QC [IP24] Susie Lees [IP100] Chris Webster [IP103] Joanna Paul [IP50] Jessica Hutchings [IP64] Gareth Bodle [IP 61, 58, 104, 53, 81] Jeanette Fitzsimons [IP82] Pat Clark [IP 63, 102] Kay Weir [IP 84] Duncan Currie [IP82]

Additional Hearings

08 Mar 01 Wgtn	Ian Lindenmayer Dr Marion Healy Dr Paul Brent	Australia and New Zealand Food Authority *[general public submission]*	Chris Hodson QC [IP24] Sue Kedgley [IP 83, 86] Susie Lees [IP 100, 102] Mr Collins QC [IP63] Mr Law [IP106] Mr Mattingley-Cameron [IP84] John Upton QC [RCGM]

Date & location of hearing	In order of appearance before the Commission (counsel, presenter, witnesses)	Appearing for (Interested Person name & no.)	Cross examined by and on behalf of
Rebuttal and New Evidence			
12 Mar 01 Wgtn	John Forman Dr Dave Palmer Dr Mike Eccles	Lysosomal Diseases New Zealand [IP99]	Dr Sean Weaver [IP83]
Closing and Legal Submissions			
12 Mar 01 Wgtn	John Upton QC Grant Pearson	Counsel Assisting the Commission	
12 Mar 01 Wgtn	Chris Hodson QC	New Zealand Life Sciences Network [IP24]	
13 Mar 01 Wgtn	Alan McKenzie Dr Joan Wright	New Zealand Dairy Board [IP 67]	
13 Mar 01 Wgtn	Dr Ian Warrington	Association of Crown Research Institutes [IP22], Ag Research [IP13], Crop and Food Research [IP4], HortResearch [IP5] *and* Forest Research [IP2] *joint presentation*	
13 Mar 01 Wgtn	Dr Bas Walker	Environmental Risk Management Authority [IP 76]	
13 Mar 01 Wgtn	Duncan Currie Stephanie Howard Tamsin Vuetilovoni Royden Hindle	Greenpeace New Zealand [IP82]	
13 Mar 01 Wgtn	Alison White Dr Robin Ord	Pesticide Action Network New Zealand [IP87]	

Date & location of hearing	In order of appearance before the Commission (counsel, presenter, witnesses)	Appearing for (Interested Person name & no.)	Cross examined by and on behalf of
14 Mar 01 Wgtn	Susie Lees	Nelson GE Free Awareness Group [IP100]	
14 Mar 01 Wgtn	Dr Morgan Williams	Parliamentary Commissioner for the Environment [IP70]	
14 Mar 01 Wgtn	Pat Clark John Carapiet	GE Free New Zealand (RAGE) in Food and Environment [IP63]	
14 Mar 01 Wgtn	Simon Reeves	Friends of the Earth (New Zealand) [IP78]	
14 Mar 01 Wgtn	David Parker	A2 Corporation [IP26]	
15 Mar 01 Wgtn	Tom Bennion Jeanette Fitzimons	Green Party of Aotearoa/New Zealand [IP83]	
15 Mar 01 Wgtn 15 Mar 01 Wgtn	Kay Weir John Forman	Pacific Institute of Resource Management [IP84], Lysosomal Diseases New Zealand [IP99] *and* New Zealand Organisation for Rare Diseases [IP98] *joint presentation*	
15 Mar 01 Wgtn	Dr Audrey Jarvis	Interchurch Commission on Genetic Modification [IP 49]	

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Context and process

Section contents

4.3 Public Meetings programme

Schedule of Public Meetings

Date (2000)	Location	Time	Venue
18 September Monday	Invercargill	2 pm–8 pm	Victoria Room, Civic Complex, 88 Tay Street
19 September Tuesday	Dunedin	2 pm–8 pm	Glenroy Room, The Dunedin Centre, 1 Harrop Street
20 September Wednesday	Christchurch	2 pm–8 pm	Hotel Grand Chancellor, 161 Cashel Street
21 September Thursday	Greymouth	11.30 am–4 pm	The Trowbridge Room, Regent Theatre, Herbert & Mackay Sts
25 September Monday	Nelson	2 pm–8 pm	Assembly Hall, Nelson College, 91-93 Waimea Road
26 September Tuesday	New Plymouth	2 pm–8 pm	La Mer Lounge, Members Stand, Pukekura Raceway & Function Centre, Mason Drive
27 September Wednesday	Palmerston North	2 pm–8 pm	Convention Hall, Convention Centre, 400 Main Street
28 September Thursday	Wellington	2 pm–8 pm	Deloitte Gallery, WestpacTrust Stadium Function Centre, Waterloo Quay
4 October Wednesday	Hamilton	2 pm–8 pm	Waikato Conference Centre, Gate 1, Brooklyn Road
5 October Thursday	Rotorua	2 pm–8 pm	The Rotorua Convention Centre, 1170 Fenton Street
11 October Wednesday	Napier	2 pm–8 pm	Blue Water Hotel, 10 West Quay, Ahuriri
12 October	Gisborne	2 pm–8 pm	Wainui Room, The Gisborne

Thursday			Hotel, Huxley & Tyndall Rds
14 November Tuesday	Manukau City	2 pm–8 pm	Manukau Function Centre, 712 Great South Road
15 November Wednesday	Auckland City	2 pm–8 pm	Alexandra Park Raceway Function Centre, Delightful Lady Lounge, Green Lane Road West, Epsom
16 November Thursday	Whangarei	11 am–4 pm	Flames International Hotel, Waverley Street, Onerahi

section 4.4 |

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Context and process

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4.4 Maori Consultation programme

Schedule of workshops and Hui

Regional Hui are indicated in bold in the list below.

Date	Programme	Location	Time	Venue
24 Oct 00 Tuesday	Workshop	Palmerston North	5.30pm-8.30pm	Te Runanganui o Rangitane, 140-148 Maxwell Line, Palmerston North
25 Oct 00 Wednesday	Workshop	Wanganui	5.30pm-8.30pm	Whanganui River Maori Trust Board, 357 Victoria Ave, Wanganui
26 Oct 00 Thursday	Workshop	New Plymouth	5.30pm-8.30pm	Te Puni Kokiri Office, 250 Devon St East, New Plymouth
27 Oct 00 Friday	Workshop	Kaikohe	5.30pm-8.30pm	Te Runanga a Iwi o Ngapuhi 16 Mangakahia Rd, Kaikohe
28 Oct 00 Saturday	Workshop	Whangarei	11am-2pm	Ngati Wai Trust Board, 171 Lower Dent St, Whangarei
4 Nov 00 Saturday	**Regional Hui**	**Wanganui**	**9.15am-5pm**	**Te Ao Hou Marae**
17 Nov 00 Friday	**Regional Hui**	**Whangarei**	**9.15am-5pm**	**Pehiaweri Marae**
20 Nov 00 Monday	Workshop	Tauranga	10am-1pm	Armitage Hotel
21 Nov 00 Tuesday	Workshop	Rotorua	10am-1pm	Te Ao Marama, Ohinemutu
22 Nov 00 Wednesday	Workshop	Whakatane	10am-1pm	Takatutahi Church Centre, Richardson Street
23 Nov 00 Thursday	Workshop	Taupo	10am-1pm	Lakes Convention Centre

Date	Programme	Location	Time	Venue
27 Nov 00 Monday	Workshop	Porirua	5.30pm-8.30pm	Takapuwahia Marae
28 Nov 00 Tuesday	Workshop	Wellington	5.30pm-8.30pm	Tapu te Ranga Marae, 44 Rhine St, Island Bay
2 Dec 00 Saturday	**Regional Hui**	**Rotorua**	**9:15am-5pm**	**Tamatekapua Marae, Ohinemutu**
4 Dec 00 Monday	Workshop	Invercargill	2.00pm-5.00pm	Nga Hau e Wha Marae, 193 Conon St
5 Dec 00 Tuesday	Workshop	Dunedin	2.00pm-5.00pm	Internal Affairs Building, cnr George Street and Octagon
7 Dec 00 Thursday	Workshop	Upper Hutt	5.30pm-8.30pm	Orongomai Marae, 1 Railway Ave
15 Dec 00 Friday	**Regional Hui**	**Wellington**	**9:15am-5pm**	**Waiwhetu Marae, 4 Puketapu Gr, Lower Hutt**
18 Jan 01 Thursday	Workshop	Picton	6.00pm-8.00pm	Waikawa Marae, 210 Waikawa Rd, Picton
19 Jan 01 Friday	Workshop	Nelson	6.00pm-8.00pm	Whakatu Marae, 99 Atawhai Dr, Nelson
23 Jan 01 Tuesday	Workshop	Napier	10.00am-12.00pm	Te Taiwhenua o Te Whanganui a Orotu, 6 Owen St, Napier
24 Jan 01 Wednesday	Workshop	Dannevirke	10.00am-12.00pm	Rangitane o Tamaki-nui-a-rua Copenhaven Square, High St, Dannevirke
27 Jan 01 Saturday	**Regional Hui**	**Blenheim**	**9:15am-5.00pm**	**Omaka Marae, Aerodrome Rd, Blenheim**
1 Feb 01 Thursday	Workshop	Ruatoria	10.00am-12.00pm	Te Runanga o Ngati Porou Board Room, Main Rd, Ruatoria
2 Feb 01 Friday	Workshop	Gisborne	10.00am-12.00pm	Te Puni Kokiri Office, Nga Wai e Rua Building, Lowe St, Gisborne
10 Feb 01 Saturday	**Regional Hui**	**Hastings**	**9:15am-5.00pm**	**Omahu Pa, 1857 State Highway 50, Fernhill, Hastings**
12 Feb 01 Monday	Workshop	Christchurch	10.00am-12.00pm	Te Puni Kokiri Office, 158 Hereford St, Christchurch

Date	Programme	Location	Time	Venue
17 Feb 01 Saturday	**Regional Hui**	**Gisborne**	**9:15am-5.00pm**	**Te Poho-o-Rawiri Marae, Park Drive, Gisborne**
19 Feb 01 Monday	Workshop	Hokitika	10.00am-12.00pm	Te Puni Kokiri Office, Mountain Jade Complex, cnr Sewell & Weld Sts, Hokitika
24 Feb 01 Saturday	**Regional Hui**	**Christchurch**	**9:15am-5.00pm**	**Te Waipounamu House**
27 Feb 01 Tuesday	Workshop	South Auckland	10.00am-12.00pm	Manukau Urban Maori Authority Office, 7 Shirley Rd, Papatoetoe
27 Feb 01 Tuesday	Workshop	West Auckland	2.00pm-4.00pm	Waipareira Trust Office, cnr Edmonton & Great North Rds, Henderson
28 Feb 01 Wednesday	Workshop	North Shore	10.00am-12.00pm	Awataha Marae, 58 Akoranga Drive, Northcote
6 Mar 01 Tuesday	**Regional Hui**	**Dunedin**	**9:15am-5.00pm**	**Otakou Marae Tamatea Rd, Otakou**
10 Mar 01 Saturday	**Regional Hui**	**Auckland**	**9:15am-5.00pm**	**Orakei Marae, 59A Kitemoana St, Orakei**
12 Mar 01 Monday	Workshop	Pukekohe	10:00am-12:00pm	Huakina Development Trust, Huakina House, 15 Roulston St
12 Mar 01 Monday	Workshop	Hamilton	2:00pm-4:00pm	Te Puni Kokiri Office, Conference Room, Level 4, Deka Building, Garden Place
13 Mar 01 Tuesday	Workshop	Te Kuiti	10:00am-12:00pm	Maniapoto Maori Trust Board Office, 1st floor, NZ Post Building, Rora Street
6–8 April 2001	**National Hui**	**Ngaruawahia**		**Turangawaewae Marae**

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4.5 Background papers and authors

The background papers were prepared at the request of the Commission at the outset of its inquiry to help provide an initial understanding of the topics that fell within its scope, an awareness of some of the potential issues that the inquiry would evoke, and information on the various topics that were the subject of the inquiry.

In planning these papers, the topic of genetic modification was divided into nine areas, representing different aspects of the inquiry as defined by the Commission's Warrant. Authors were asked to outline the current situation, practices or status with regard to genetic modification and the topic of their paper. They were asked to note areas of uncertainty, knowledge gaps, and varying perspectives about the effects or value of genetic modification, and to describe trends and likely future developments. The authors were also asked to provide a list of questions and issues to be considered during the course of the inquiry, and those were carried forward into the Public Scoping days held in Wellington on 7–9 August.

Having received the papers, the Commission invited peer reviews where it was felt alternative perspectives might need to be canvassed. Neither the papers nor the reviews reflected or indicated the Commission's viewpoint at the time. Copies of these papers were placed on the Commission website.

List of papers and their authors

Current uses

Professor A.R. Bellamy MSc, PhD, FRSNZ

Dick Bellamy is Professor of Cellular and Molecular Biology and Director of the School of Biological Sciences at the University of Auckland. His initial degree was in Botany and his PhD in Microbiology. Dick's research interest centres on human viruses, particularly rotavirus, a virus responsible for gastroenteritis in young children. A research project currently under way in his laboratory involves the use of genetically modified plants to express viral proteins for vaccine production.

Legal aspects

Helen Atkins

Helen Atkins is a partner in the Wellington office of Phillips Fox, Lawyers. Helen has specialised in public, environmental, resource management and local government law for 10 years. Helen has been involved in the Hazardous Substances and New Organisms (HSNO) legislation process since the early days when she was on secondment to the Ministry for the Environment in 1993–1995. Helen has been involved in hearings in front of the Environmental Risk Management Authority (ERMA) in relation to applications to develop genetically modified organisms in containment. She has acted for chemical companies and assisted at New Zealand Chemical Industry Council seminars in the early days of the life of the HSNO Act. More recently, Helen presented a paper to the 2nd Annual ERMA Conference in Wellington on her views of the hearing process that ERMA has adopted.

Ethical issues

Dr Barbara Nicholas

Dr Barbara Nicholas is a bioethicist, with a background in science and theology. She has worked as a health policy analyst, researcher in Health Technology Assessment, and lecturer in bioethics at Otago Medical School. Her recent research has included empirical and philosophical research on the social and ethical impact of genetic technology.

This paper was peer reviewed by Prof Donald Evans, Director, Bioethics Centre, University of Otago.

Public perceptions

Joanna Gamble

Joanna Gamble is a consumer scientist at HortResearch in Auckland. She has a Masters degree in Psychology, and has worked in consumer and market research for five years. She currently manages the Foundation for Research, Science and Technology funded project "Public Perceptions of Transgenic Plants and Plant-Based Products".

Maori aspects

Bevan Tipene Matua

Bevan Tipene Matua was raised in Porangahau, Hawke's Bay, and is of Ngati Kahungunu, Ngai Tahu, Ngati Raukawa, and Rangitane descent. In 1994 he received a research fellowship at Crop and Food Research, Lincoln, while

completing a masters thesis on the effects on Maori and other indigenous peoples of the Convention on biological diversity, intellectual property rights and biotechnology. Bevan has since worked in related areas for government and iwi. He is currently doing a PhD on the sociocultural perceptions of risk which focuses on Maori perceptions of genetic engineering. At the time of writing the background papers, he worked as a Senior Policy Advisor (Maori) for the Environmental Risk Management Authority (ERMA) and is a lecturer in Maori Studies at Canterbury University. His views did not reflect ERMA policy. He has subsequently assisted the Commission in the running of its Maori Consultation programme workshops.

Environmental aspects

Dr Lin Roberts

Dr Lin Roberts is Director of Business and Environment Consultants in Christchurch. Her main work area is promoting sustainability in business and agriculture. She also teaches Masters programmes at Canterbury and Lincoln, and advises on research strategies. Prior to establishing her consultancy, she was a Claude McCarthy Fellow at Victoria University (1993–1994), and held various roles at the Ministry for the Environment (1986–1993). During that time she was Chair of the Interim Assessment Group for Field Testing and Release of Genetically Modified Organisms (1989–1990); Chair of the New Organisms Steering Group (which developed the policy behind the NO part of HSNO), and Manager in the Ministry for the Environment with responsibility for HSNO (1991–1993). Before this, Lin was a post-doctoral fellow at Texas A&M University and a scientist working in biological control, Entomology Division DSIR (1980–1984).

This paper was peer reviewed by Clare Miller and D M Suckling, HortResearch, Lincoln.

Economics

Dr Janice Wright

Dr Janice Wright originally trained as a scientist and graduated from the University of Canterbury as a Senior Scholar in Physics. A developing interest in policy applications of science led her to the University of California at Berkeley to study Natural Resource Management with a focus on energy. More recently, she completed a doctorate in Public Policy at Harvard University, working at the Harvard Center for Risk Analysis, and completing a dissertation on decision-making in the environmental and health sectors. Since returning to New Zealand

two years ago, Dr Wright has worked as an independent policy adviser and analyst. She is a member of the Independent Biotechnology Advisory Council (IBAC) and led their project on the economic implications of a first release of a genetically modified organism for food production.

This paper was peer reviewed by Peter Clough.

Human health aspects

Dr Michael Berridge

Dr Berridge gained a PhD from the University of Auckland in the field of molecular regulation of plant growth. He gained postdoctoral experience at Purdue University in the United States investigating gene regulation in early development and was subsequently employed on the scientific staff at the Medical Research Council laboratories at Mill Hill, London. He returned to Wellington in 1976 where he established a research programme concerned with molecular regulation of blood cell development and is presently Acting Director of the Malaghan Institute. Dr Berridge is secretary of the New Zealand Association of Scientists.

This paper was peer reviewed by Joanne Dixon, medical geneticist.

The international aspects of genetic modification

Ministry of Foreign Affairs and Trade

This paper was prepared by the Ministry of Foreign Affairs and Trade, Wellington, in June 2000, in response to a request from the Commission for background information. It was revised in August 2000 to include a reference to the decision taken by the Australia New Zealand Food Standards Council on the labelling of genetically modified foods. The paper is not a submission. It does not represent a Ministry or a New Zealand Government view.

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4.6 Commission members

The Warrant appointed four members to the Commission. Biographical details are given below.

Thomas Eichelbaum

The Right Honourable Sir Thomas Eichelbaum is the Chair of the Commission. Sir Thomas was Chief Justice of New Zealand from 1989 to 1999. He was knighted in 1989 and became a Privy Councillor the same year.

Sir Thomas was born in Germany and emigrated with his parents to New Zealand in 1938.

He practised as a lawyer from 1953 and was appointed Queen's Counsel in 1978. During his career, Sir Thomas appeared regularly in a wide range of litigation before the New Zealand courts and tribunals, and served as counsel in a number of Commissions of Inquiry, including the Lake Manapouri Commission in 1970, the Inquiry into Chiropractic in 1978 and the Marginal Lands Inquiry in 1981.

He was appointed a Judge of the High Court in 1982, and has been chair or a member of numerous professional and judiciary-related committees. He is a former President of the New Zealand Law Society.

Sir Thomas is a part-time member of the Courts of Appeal of Hong Kong and Fiji, an honorary member of the American Bar Association, an honorary Bencher of Lincoln's Inn, London, and an honorary member of the International Academy of Trial Lawyers.

He brings a strong understanding of legal and judicial processes to the inquiry.

Richard Randerson

The Right Reverend Richard Randerson, a bishop of the Anglican Church and Dean of Holy Trinity Cathedral in Auckland, has an extensive academic background in classics, theology, ethics and economics. Studying initially at Otago University, he later undertook postgraduate work in New York and San Francisco.

He has worked in ministries overseas and in New Zealand. He was Social Responsibility Commissioner for the Anglican Church between 1990 and 1994,

and in 1994 was appointed Assistant Bishop (for Church in Society) in Canberra, Australia. In 1999, he chaired a Government Poverty Task Force in Canberra.

His interest during his professional life has been to promote an ethical base for public policy with regard to socioeconomic matters, industrial relations, corporate responsibility, the role of women, the environment, Treaty of Waitangi relationships, and a multicultural society.

Bishop Randerson has worked as a parish minister in New Zealand, New York and the United Kingdom. He was Director of the Auckland Industrial Mission from 1971 to 1978, and, as Vicar of St Peter's Church in the 1980s, was part of Wellington's Inner City Ministry. He played an active role in establishing bicultural frameworks for the Anglican Church in New Zealand.

Jean Fleming

Dr Jean Fleming is highly qualified in the fields of biochemistry, physiology and reproductive biology. She is a Senior Lecturer in Anatomy and Structural Biology at the University of Otago School of Medical Sciences.

Her research and publications are in the area of molecular reproduction and endocrinology. In 1987, she was an ANZAC Fellow in the Genetic Engineering Laboratory, Howard Florey Institute, Melbourne.

Dr Fleming's research seeks to understand the genetic and developmental differences between male and female animals and why these differences have evolved. Her research includes investigations into the causes of ovarian cancer, mutation rate in spermatogenesis and growth factor expression in liver disease; including the different responses of males and females to injury.

Dr Fleming has a strong interest in encouraging the involvement of women in science, their approach to research, and their support networks. She convened the 1993 Women's Suffrage Centennial Science Conference, and participated in both Women: Science and our Future (1996) and Living Science (1999) conferences run by the New Zealand Association for Women in Sciences.

She has an interest in feminist pedagogy and, in particular, whether women bring a different approach to the teaching of reproductive biology and endocrinology.

Dr Fleming served as president of the Otago Institute Inc, a branch of the Royal Society of New Zealand, between 1997 and 1998, and chaired the programme committee of the inaugural International Science Festival in Dunedin, in 1998.

She brings a sound understanding of scientific method and principles to the inquiry. Her familiarity with biological and genetic research, and her understanding of gene function, has been of great assistance to the Commission.

Jacqueline Allan

Dr Jacqueline Sherburd Te Makahi Allan (Kuti Mamoe ki Rakiura, Kai Tahu) is a General Practitioner in South Auckland, with expertise in community and Maori health.

Over the past two decades she has served, and still serves, on many professional committees and advisory boards. She has both teaching and medical qualifications.

With Inez Kingi, she co-founded, and is the medical director of, Tipu Ora — the Maori Mother and Child Health Organisation. She has been involved in the establishment of a number of other community Maori health initiatives.

Dr Allan is involved with the Women's Health League and was a founding member of Te ORA (Te Ohu Rata o Aotearoa/the Maori Medical Practitioners Association) with which she is currently involved in a project to provide mentoring and training for young Maori doctors.

A rural upbringing and a large whanau spread throughout all three islands keeps her in touch with issues all over New Zealand. A love of outdoor life takes her flyfishing for solitude and relaxation into some of our remote rivers.

Dr Allan brings an understanding of both medical and Maori issues to the Commission.

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4.7 Commission establishment

The names of people and businesses assisting the Commission at various times throughout the course of the inquiry are listed below.

Management

Kay Hewitt

Kaumatua

Pihopa and Inez Kingi

Counsel assisting the Commission

Brendan Brown QC

John Upton QC

Grant Pearson

Core secretariat/Executive

Sarah Adamson

Elizabeth Beale

Kate Mitchell

Moire Morrison

Analysis and research

Lance Beath

Julie Browne

Sandra Davies

Trina Dyall

Anne Heynes

Pamela Johnston

Philippa McDonald

Barbara Nicholas

Kathryn Smith

Gavin Burgess

Nik Cox

Melanie Kohler

Administration and support

Elizabeth Ashby
Gemma Catley
Joanne Charles
Katherine Gouldstone
Reece Kohatu
Gavin Koroi
Anthony Leaupepe
Terese McLeod
Melanie O'Neill
James Pouwhare
Ben Willoughby
Atlantic & Pacific Business Travel
Baseline
BRC Marketing & Social Research
Datamail
Centre for Research, Evaluation and Social Assessment (CRESA)
Hyperactive
Matt McMillan
Denis & Taape O'Reilly
Parker Duignan (Jennifer Parker & Paul Duignan)
Printlink
Pronto
Selectnet
Synergy International Limited
Techtonics
Te Tawa Limited (Rangi McGarvey)
Te T. White Consultancy Limited (Te Taru White)
Bevan Tipene Matua
Verbatim Transcript Services (Rawinia Hauraki & staff)
Vidcom
VIP Transport

Communications and Editorial

Annamaria Apáthy

Byword Pacific Ltd (Barbara Hedley)

Knighton & Associates Ltd (Judy Knighton)

Pinnacle Publishing (Penn Pattison)

Suzanne Pollard

Katherine Sylvester

Vero Graphic Design Ltd (Veronica Alkema)

Piripi Walker

Wordset Enterprises Limited (Linda Guinness)

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5.1 Glossary of technical terms

This glossary of technical terms indicates the source of the definition. It presents, in some instances, more than one definition of a term, with the second entry providing an expanded explanation. Expanded definitions may also focus on the application of the terms in the field of genetic modification rather than in their widest context. Entries have been edited to conform with report style if necessary. Some entries, marked [New Zealand], provide an explanation particularly applicable to New Zealand circumstances.

allergen

A substance that causes an allergic reaction.

Waiter, there's a Gene in My Food

also **allergic reaction, allergy**: an exaggerated physical response to some antigen, typically a common environmental substance, that produces little or no response in the general population, resulting when histamine or histamine-like substances are released from injured cells. It involves various respiratory and dermatological symptoms, such as sneezing or itching.

Academic Press Dictionary of Science and Technology

also **allergenicity**: Ability to induce various types of allergic responses (also known as hypersensitivity responses).

Virology/Immunology

amino acid

The basic subunit of a protein, coded by triplets of bases in the DNA blueprint. There are 20 amino acids universally found in proteins.

Bernie May

The fundamental building blocks of a protein molecule. A protein is composed of a chain of hundreds or thousands of amino acids. Our bodies can synthesise most of the amino acids. However, eight amino acids (called "essential amino acids") must be obtained from food.

About Biotechnology

antibiotic resistance

The ability of a bacterium to synthesise a protein that neutralises an antibiotic.

BioTech Life Sciences Dictionary

also **antibiotic resistance genes**: Genes in a microorganism that confer resistance to antibiotics, for example by coding for enzymes that destroy it, by coding for surface proteins that prevent it from entering the microorganism, or by being a mutant form of the antibiotic's target so that it can ignore it.

BioTech Life Sciences Dictionary

antibody

A protein produced in response to the presence of a specific antigen.

About Biotechnology

antigen

A usually protein or carbohydrate substance (as a toxin or enzyme) capable of stimulating an immune response.

Merriam-Webster's Collegiate Dictionary

aquaculture

The cultivation of the natural produce of water (as fish or shellfish).

Merriam-Webster's Collegiate Dictionary

1. The cultivation of aquatic plants and animals for human food consumption or other human use.

2. Specifically, freshwater cultivation, as opposed to marine cultivation (mariculture).

Academic Press Dictionary of Science and Technology

autoimmune

A condition where the body's immune system is unable to distinguish between foreign particles and the body's own cells and as a result attacks normal body tissue.

BioTech Life Sciences Dictionary

bacteriophage

see **phage**

biocontrol, biological control

The use of one organism to control the population size of another organism.

About Biotechnology

The agricultural use of living things, such as parasites, diseases, and predators, to control or eliminate others, such as weeds and pests, rather than by using chemicals (herbicides and pesticides).

BioTech Life Sciences Dictionary

biodiversity, biological diversity

The existence of a wide range of different types of organisms in a given place at a given time.

BioTech Life Sciences Dictionary

The variability among living organisms from all sources including, among other things, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are a part; this includes diversity within species, between species and of ecosystems.

World Foundation for Environment and Development

also **biodiversity prospecting** or **'bioprospecting'**: The search for useful genetic and biochemical compounds and materials and related information in nature.

bioinformatics

The newly developed computer-based discipline that organises biological data, particularly genetic data.

The Current Uses of Genetic Modification

The use of computers in solving information problems in the life sciences; mainly, it involves the creation of extensive electronic databases on genomes, protein sequences, etc. Secondarily, it involves techniques such as the three-dimensional modelling of biomolecules and biological systems.

BioTech Life Sciences Dictionary

biomedicine

Medicine based on the application of the principles of the natural sciences and especially biology and biochemistry.

Merriam-Webster's Collegiate Dictionary

also **biomedical engineering**: The use of engineering technology, instrumentation and methods to solve medical problems, such as improving our understanding of physiology and the manufacture of artificial limbs and organs.

BioTech Life Sciences Dictionary

bioremediation

The use of plants or microorganisms to clean up pollution or to solve other environmental problems.

BioTech Life Sciences Dictionary

biosecurity

The protection of people and natural resources from unwanted organisms capable of causing harm.

Environmental Performance Indicators Programme

[*New Zealand*] The cost effective protection of any natural resources from organisms capable of causing unwanted harm. The Biosecurity Act 1993 is the main act dealing with biosecurity issues. It has resulted in changes to the way biosecurity is managed and viewed.

Previously, pest management largely had an agricultural or horticultural focus. But this tended to overlook other pests, like environmental pests. With the passing of the Biosecurity Act, when we now talk about biosecurity pests, we mean a wide range of organisms that are harmful, not only to production industries, but also to the environment (including the land, freshwater and marine environments, as well as to people). That includes undesirable animals, undesirable plants such as weeds, and organisms that attack animals and plants (including disease-causing microorganisms).

MAF Rural Bulletin May 1999

biotechnology

Any technological application that uses biological systems, living organisms, or derivatives thereof, to make or modify products or processes for specific use.

World Foundation for Environment and Development

The industrial use of living organisms or biological techniques developed through basic research. Biotechnology products include antibiotics, insulin, interferon, recombinant DNA, and techniques such as waste recycling. Much older forms of biotechnology include breadmaking, cheesemaking and brewing wine and beer.

BioTech Life Sciences Dictionary

carbohydrate

Any of various neutral compounds of carbon, hydrogen, and oxygen (as sugars, starches, and celluloses), most of which are formed by green plants and which constitute a major class of animal foods.

Merriam-Webster's Collegiate Dictionary

chromosome

Structure containing DNA and proteins in the cell nucleus.

Bernie May

Components in a cell that contain genetic information. Each chromosome contains numerous genes. Chromosomes occur in pairs: one obtained from the mother; the other from the father. Chromosomes of different pairs are often visibly different from each other.

About Biotechnology

clone

(of DNA): An identical copy. The term may be applied to a fragment of DNA, a plasmid that contains a single fragment of DNA, or a bacterium that contains such a plasmid.

(of animal): An identical offspring, generally created by transfer of an identical nucleus into a recipient egg.

The Current Uses of Genetic Modification

(1) To insert a piece of DNA into a vector for subsequent amplification and isolation of that specific piece;

(2) A piece of DNA composed of a vector and its insert.

Bernie May

also **cloning vector**: Biological carriers such as plasmids, bacteriophages, or cosmids used to amplify an inserted DNA sequence.

Bernie May

containment

(biological): Containment based on a biological barrier that prevents the transmission or escape of an organism.

(physical): Containment achieved by the control of access, restriction of air circulation, and/or the provision of other secure physical barriers.

The Current Uses of Genetic Modification

also **containment facility**: [*New Zealand*] A place approved in accordance with section 39 of the Biosecurity Act, for holding organisms that should not become established in New Zealand.

MAF Biosecurity Authority

copyright

The exclusive legal right to reproduce, publish, and sell the matter and form (as of a literary, musical, or artistic work).

Merriam-Webster's Collegiate Dictionary

cultivar

A cultivated plant or animal that has no known wild ancestor.

BioTech Life Sciences Dictionary

A variety of plant produced through selective breeding by humans and maintained by cultivation.

The Genomics Lexicon

DNA

Deoxyribonucleic acid, the chemical at the centre of the cells of living things which controls the structure and purpose of each cell and carries genetic information during reproduction.

Cambridge International Dictionary of English

A nucleic acid that constitutes the genetic material of all cellular organisms and the DNA viruses; DNA replicates and controls through messenger RNA the inheritable characteristics of all organisms. A molecule of DNA is made up of two parallel twisted chains of alternating units of phosphoric acid and deoxyribose, linked by crosspieces of the purine bases and the pyrimidine bases, resulting in a right-handed helical structure, that carries genetic information encoded in the sequence of the bases.

Academic Press Dictionary of Science and Technology

ecosystem

The complex of a community of organisms and its environment functioning as an ecological unit.

Merriam-Webster's Collegiate Dictionary

enzymes

Proteins that control the various steps in all chemical reactions.

An Agricultural and Environmental Biotechnology Annotated Dictionary

Any of numerous complex proteins that are produced by living cells and catalyse specific biochemical reactions at body temperatures.

Merriam-Webster's Collegiate Dictionary

also **restriction enzyme:** any of various enzymes that break DNA into fragments at specific sites in the interior of the molecule — called also restriction endonuclease.

Merriam-Webster's Collegiate Dictionary

expression (gene)

The process by which proteins are made from the instructions encoded in DNA.

NHGRI Glossary of Genetic Terms

The process by which a gene's coded information is converted into the structures present and operating in the cell. Expressed genes include those that are transcribed into mRNA and then translated into protein and those that are transcribed into RNA but not translated into protein (eg, transfer and ribosomal RNAs).

BioTech Life Sciences Dictionary

field trial

A trial of a new product in actual situations for which it is intended.

Merriam-Webster's Collegiate Dictionary

gene

A unit of hereditary information. A gene is a section of a DNA molecule that specifies the production of a particular protein.

About Biotechnology

A locus on a chromosome that encodes a specific protein or several related proteins. It is considered the functional unit of heredity.

An Agricultural and Environmental Biotechnology Annotated Dictionary

gene construct

A sequence of genes made by joining several genes together artificially in the laboratory.

Genewatch

gene knockout

Inactivation of specific genes. Knockouts are often created in laboratory organisms such as yeast or mice so that scientists can study the knockout organism as a model for a particular disease.

NHGRI Glossary of Genetic Terms

gene product

The protein produced by a gene.

The Genomics Lexicon

gene therapy

The process of introducing new genes into the DNA of ... cells to correct a genetic disease or flaw. (1) Human gene therapy: Insertion of normal DNA directly into cells to correct a genetic defect. (2) Somatic cell gene therapy: The repair or replacement of a defective gene within somatic tissue.

BioTech Life Sciences Dictionary

(3) Germ-line (gene) therapy: The repair or replacement of a defective gene within the gamete-forming tissues, which produces a heritable change in an

organism's genetic constitution.

An Agricultural and Environmental Biotechnology Annotated Dictionary

gene transfer

The transfer of genes into a cell by any of a number of different methods available.

BioTech Life Sciences Dictionary

Insertion of unrelated DNA into the cells of an organism. There are many different reasons for gene transfer: for example, attempting to treat disease by supplying patients with therapeutic genes. There are also many possible ways to transfer genes. Most involve the use of a vector, such as a specially modified virus that can take the gene along when it enters the cell.

NHGRI Glossary of Genetic Terms

genetic code

The way genetic information is stored in living organisms.

About Biotechnology

The biochemical basis of heredity consisting of codons in DNA and RNA that determine the specific amino acid sequence in proteins and appear to be uniform for all known forms of life.

Merriam-Webster's Collegiate Dictionary

genetic engineering (GE)

see **genetic modification**

genetic marker

A usually dominant gene or trait that serves especially to identify genes or traits linked with it.

Merriam-Webster's Collegiate Dictionary

A segment of DNA with an identifiable physical location on a chromosome and whose inheritance can be followed. A marker can be a gene, or it can be some section of DNA with no known function. Because DNA segments that lie near each other on a chromosome tend to be inherited together, markers are often used as indirect ways of tracking the inheritance pattern of a gene that has not yet been identified, but whose approximate location is known.

NHGRI Glossary of Genetic Terms

genetic modification (GM)

Altering the genetic material of cells or organisms in order to make them capable of making new substances or performing new functions.

The Genomics Lexicon

The technique of removing, modifying or adding genes to a DNA molecule in order to change the information it contains. By changing this information, genetic engineering changes the type or amount of proteins an organism is capable of producing.

About Biotechnology

Note: for purposes of the Commission, the term "genetic modification" is defined in the Warrant establishing the Commission (see page 159).

genetically modified organism (GMO)

Organisms that have had genes from other species inserted into their genome.

Functional Genomics Glossary

An organism whose genome has been altered by the inclusion of foreign genetic material. This may be derived from other individuals of the same or wholly different specifies, or of an artificial nature. Foreign genetic information can be added to the organism during its early development and incorporated in cells of the entire organism. Genetic information can also be added later in development to selected portions of the organism.

Functional Genomics Glossary

genome

The total hereditary material of a cell.

About Biotechnology

The genetic complement contained in the chromosomes of a given organism, usually the haploid chromosome state.

An Agricultural and Environmental Biotechnology Annotated Dictionary

also **genome projects:** Research and technology development efforts aimed at mapping and sequencing some or all of the genome of human beings and other organisms.

BioTech Life Sciences Dictionary

genomics

The discipline involving the study of the collection of genes found in an organism.

The Current Uses of Genetic Modification

The study of genomes, which includes genome mapping, gene sequencing and gene function.

BioTech Life Sciences Dictionary

also **genomic healthcare**: Healthcare which utilises advances made by the science of genomics.

The Genomics Lexicon

also **genomic library**: A random collection of cloned DNA fragments (usually in viral or cosmid vectors) that together represent virtually all of an organism's DNA. Partial or subgenomic libraries contain only restriction fragments of a certain size range.

Bernie May

germ cell

Reproductive cell.

An Agricultural and Environmental Biotechnology Annotated Dictionary

Sperm and egg cells, and their precursors. Germ cells are haploid and have only one set of chromosomes (23 in all), while all other cells have two copies (46 in all).

The Genomics Lexicon

glyphosate

A white compound, $C_3H_8NO_5P$, that is soluble in water, used as a broad-spectrum herbicide.

The American Heritage Dictionary of the English Language

herbicide

Any substance that is toxic to plants; usually used to kill specific unwanted plants.

An Agricultural and Environmental Biotechnology Annotated Dictionary

Any agent, either organic or inorganic, used to destroy unwanted vegetation, especially weeds and grasses; selective herbicides eliminate weeds without destroying desirable crop or garden plants; nonselective herbicides destroy all vegetation in the given area.

Academic Press Dictionary of Science and Technology

horizontal gene transfer

The transfer of genes or genetic material directly from one individual to another by processes similar to infection. It is distinct from the normal process of vertical gene transfer — from parents to offspring — which occurs in reproduction. Natural agents exist which can transfer genes horizontally between individuals. These are viruses, many of which cause diseases, and other pieces of parasitic genetic material, called plasmids and transposons, many of which carry and spread antibiotic and drug resistance genes. These

are able to get into cells and then make use of the cell's resources to multiply many copies or to jump into (as well as out of) the cell's genome. The natural agents are limited by species barriers, so that for example, pig viruses will infect pigs, but not human beings, and cauliflower viruses will not attack tomatoes. However, genetic engineers make artificial vectors (carriers of genes) by combining parts of the most infectious natural agents, with their disease-causing functions removed or disabled, and design them to overcome species barriers, so the same vector may now transfer, say, human genes, which are spliced into the vector, into the cells of all other mammals, or cells of plants.

ngin (Norfolk Genetic Information Network)

immunotherapy

(1) A medical technique for stimulating a patient's immune system to attack and destroy disease-causing cells (viruses, bacteria, cancer cells, etc)

(2) A type of medical treatment which includes a combination of immunopotentiator and immunosuppressant agents, desensitisation to any allergens, bone marrow transplants, and thymus implantations.

Biotech Life Sciences Dictionary

'in silico'

In or by means of a computer simulation.

World Wide Words

intellectual property

Useful artistic and industrial information and knowledge.

International Law Dictionary and Directory

That area of the law involving patents, copyrights, trademarks, trade secrets, and plant variety protection.

Shaping Genes

marker genes

Genes that identify which plants [or animals] have been successfully transformed.

About Biotechnology

metabolic disease

An inherited enzyme abnormality.

Nutritional and Metabolic Diseases.

mRNA (messenger RNA)

The class of RNA molecules that copies the genetic information from DNA, in the nucleus, and carries it to ribosomes, in the cytoplasm, where it is translated into protein.

An Agricultural and Environmental Biotechnology Annotated Dictionary

mutagenesis

The occurrence or induction of mutation.

Merriam-Webster's Collegiate Dictionary

The introduction of permanent heritable changes (ie, mutations) into the DNA of an organism. In the case of site-directed mutagenesis, the substitution or modification of a single amino acid at a defined location in a protein is performed by changing one or more base pairs in the DNA using recombinant DNA technology.

Functional Genomics Glossary

nutraceutical

Any substance that is a food or a part of a food and provides medical or health benefits, including the prevention and treatment of disease. [Note: "Nutraceutical" and "nutriceutical" are frequently used interchangeably.]

Nutraceutical Alliance

nutriceutical

Nutriceutical is a term derived from the words 'nutrition' and 'pharmaceutical'. A nutriceutical is a product that combines food and an active ingredient such as a drug or a vitamin or some other chemical substance. These products are on the leading edge of development and are a nineties phenomenon. [Note: "Nutraceutical" and "nutriceutical" are frequently used interchangeably.]

ScienceNet

oleic acid

An oily liquid, $C_{17}H_{33}COOH$, occurring in animal and vegetable oils and used in making soap.

The American Heritage Dictionary of the English Language

organic

Of, relating to, yielding, or involving the use of food produced with the use of feed or fertiliser of plant or animal origin without employment of chemically formulated fertilisers, growth stimulants, antibiotics, or pesticides.

Merriam-Webster's Collegiate Dictionary

organism

An individual animal, plant, or single-celled life form.

Waiter, there's a Gene in My Food

patent

Title by which a government grants the exclusive right to make use of an invention for a fixed time period.

Money Words

pesticide

A chemical which is used to kill unwanted organisms such as rats, insects, nematodes, etc. Pesticides often act as nerve poisons, and they are hazardous to animals and humans (some pesticides can cause nerve or liver damage, birth defects and cancer).

Biotech Life Sciences Dictionary

A substance that kills harmful organisms (for example, an insecticide or fungicide).

An Agricultural and Environmental Biotechnology Annotated Dictionary

phage, bacteriophage

A virus for which the natural host is a bacterial cell. Used as a vector for cloning segments of DNA.

Functional Genomics Glossary

(Bacteriophage) A virus that parasitises bacteria. It initiates infection by attaching itself by its tail to the wall of bacterial cell. Through enzyme action the bacteria wall is perforated and the bacteriophage DNA or RNA passes through into bacterial cell. It uses the cell's machinery to make more bacteriophage DNA and bacteriophages, which are released by breakage of the bacterial cell.

A Dictionary of Biology

phenotype

The observable characteristics of a genetically controlled trait.

Marine Biological Laboratory

The observable characteristics of an organism as opposed to the set of genes it possesses (its genotype). The phenotype that an organism manifests is a result of both genetic and environmental factors. Therefore, organisms with the same genotype may display different phenotypes due to environmental factors. Conversely, organisms with the same phenotypes may have different genotypes.

About Biotechnology

Plant Variety Rights

[*New Zealand*] A grant of Plant Variety Rights for a new plant variety gives the holder the exclusive right to produce for sale and to sell propagating material of the variety. In the case of vegetatively propagated fruit and ornamental varieties Plant Variety Rights gives the holder the additional exclusive right to propagate the protected variety for the purpose of the commercial production of fruit, flowers or other products of the variety.

Plant Variety Rights Office

plasmid

A small, circular piece of DNA found outside the chromosome in bacteria. Plasmids are the principal tools for inserting new genetic information into microorganisms or plants.

About Biotechnology

A structure composed of DNA that is separate from the cell's genome. In bacteria, plasmids confer a variety of traits and can be exchanged between individuals — even those of different species. Plasmids can be manipulated in the laboratory to deliver specific genetic sequences into a cell.

The Genomics Lexicon

protein

A biological molecule which consists of many amino acids chained together by peptide bonds. The sequence of amino acids in a protein is determined by the sequence of nucleotides in a DNA molecule. As the chain of amino acids is being synthesised, it is also folded into higher order structures shaped, for example, like helices or like flat sheets. Proteins are required for the structure, function, and regulation of cells, tissues, and organs in the body.

The Genomics Lexicon

proteomics

The new discipline that aims to identify and characterise all the proteins present in a cell.

The Current Uses of Genetic Modification

recombinant DNA

DNA molecules that have been created by combining DNA from more than one source.

The Genomics Lexicon

Recombinant DNA is a fragment of DNA incorporated artificially into the DNA molecule of a suitable vector so that it can express itself many times. This way a large quantity of the DNA in question can be obtained. The DNA

is usually one that contains genes of interest, such as interferon, insulin, or growth hormone. The DNA may also be intended to fix mutated genes causing diseases, such as haemophilia or sickle cell anaemia. The vector could be plasmids, bacteriophages, and cosmids (packaged plasmid DNA into a phage particle).

BioTech Life Sciences Dictionary

also **recombinant clones**: Clones containing recombinant DNA molecules.

BioTech Life Sciences Dictionary

also **recombinant DNA technology**: The technology upon which genetic engineering or genetic modification is based. The process involves DNA being joined together in novel combinations.

The Current Uses of Genetic Modification

sequencing

Determining the order of nucleotides in a DNA or RNA molecule, or determining the order of amino acids in a protein.

The Genomics Lexicon

service mark

A mark or device used to identify a service (as transportation or insurance) offered to customers.

Merriam-Webster's Collegiate Dictionary

A word, phrase, logo, symbol, color, sound or smell used by a business to identify a service and distinguish it from those of its competitors. If the business uses the name or logo to identify a product, such as a camera, it is called a trademark. In practice, the legal protections for trademarks and service marks are identical.

Nolo

terminator technology

The current popular term applying to the methods used to render plant seeds sterile and unable to germinate.

The Current Uses of Genetic Modification

trademark

Symbol, logo, or design that legally identifies a business or its product.

Money Words

A word, phrase, logo, symbol, color, sound or smell used by a business to identify a product and distinguish it from those of its competitors. If the business uses the name or logo to identify a service, such as photo copying, it

is called a service mark. In practice, the legal protections for trademarks and service marks are identical.

Nolo

transformation

A change in the genetic structure of an organism as a result of the uptake and incorporation of foreign DNA.

About Biotechnology

transgene

A gene transferred to a recipient organism using recombinant technology.

The Current Uses of Genetic Modification

transgenic

An organism that has been genetically engineered to contain the genes from another species.

Waiter, there's a Gene in My Food

An organism whose genome has been altered by the inclusion of foreign genetic material. This foreign genetic material may be derived from other individuals of the same species or from wholly different species. Genetic material may also be of an artificial nature. Foreign genetic information can be added to the organism during its early development and incorporated in cells of the entire organism. As an example, mice embryos have been given the gene for rat growth hormone allowing mice to grow into large adults. Genetic information can also be added later in development to selected portions of the organism. As an example, experimental genetic therapy to treat cystic fibrosis involves selective addition of genes responsible for lung function and is administered directly to the lung tissue of children and adults.

The Genomics Lexicon

transposon

A [DNA] sequence that can move about in the genome of an organism.

Marine Biological Laboratory

A segment of DNA flanked by transposable elements that is capable of moving its location in the genome.

Bernie May

vaccine

A preparation of dead or weakened pathogen, or of derived antigenic determinants, that is used to induce formation of antibodies or immunity against the pathogen.

An Agricultural and Environmental Biotechnology Annotated Dictionary

vector

An organism or a biological molecule used to transfer material to a different organism or cell. In genetic modification, this refers to an organism, bacterium or plasmid able to transfer DNA.

The Current Uses of Genetic Modification

A self-replicating DNA molecule that exists with, but is separate from the genome of the host cell. Many different vectors have been identified and genetically engineered for use in molecular biology. DNA inserted into a vector will be replicated along with the vector. In this manner, DNA of interest can be obtained in large quantities, ie, cloned. For example, the human insulin gene can be cloned into the plasmid vector pBr 322 which, in turn, will replicate in *E. coli* cultures.

Bernie May

also **cloning vector**: DNA molecule originating from a virus, a plasmid, or the cell of a higher organism into which another DNA fragment of appropriate size can be integrated without loss of the vector's capacity for self-replication; vectors introduce foreign DNA into host cells, where it can be reproduced in large quantities. Examples are plasmids, cosmids, and yeast artificial chromosomes; vectors are often recombinant molecules containing DNA sequences from several sources.

The Genomics Lexicon

virus

An infectious agent composed of a single type of nucleic acid, DNA or RNA, enclosed in a coat of protein. Viruses can multiply only within living cells.

About Biotechnology

Viruses consist of a piece of nucleic acid covered by protein. Viruses can only reproduce by infecting a cell and using the cell's mechanisms for self-replication. They can cause disease; modified viruses can also be used as a tool in gene therapy to introduce new DNA into a cell's genome.

The Genomics Lexicon

xenotransplant

Transplantation of tissue or organs between organisms of different species, genus, or family. A common example is the use of pig heart valves in humans.

The Genomics Lexicon

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section 5.2 |

5.

appendix 1

Context and process

Section contents

5.2 Glossary of Maori terms

Maori term	English equivalent in context
Aotearoa	New Zealand
hui	conferences attended by Maori
iwi	kin group, public, communities
kaihautu	host
kaikorero	representative, speaker
kanohi ki te kanohi	face to face
kaumatua	elder, elders
korero	communicate
kuia	female elders
marae	meeting house
mihimihi	welcome
papatipu	land with Maori title
powhiri	opening ceremony
rangatahi	young Maori
rangatira	chief
reo	language
reo irirangi	Maori radio
rohe	area
tangata whenua	local people, native people
taonga	assets, belongings
Te Mangai Paho	Maori Broadcasting Funding Agency
Te Puni Kokiri	Ministry of Maori Development
Te Reo (Te Reo Maori)	the Maori language
Te Taura Whiri i te Reo Maori	Maori Language Commission
Te Tiriti o Waitangi	Treaty of Waitangi
tikanga	culture, cultural, customs
tino rangatiratanga	independence
wananga	seminar, workshop

5.3 Abbreviations

Abbreviation	Meaning
ACABQ	Advisory Committee on Administrative and Budgetary Questions
ACGNT	Advisory Committee on Novel Genetic Techniques
ACVM Act	Agricultural Compounds and Veterinary Medicines Act 1997
ADB	Asian Development Bank
AIA	advance informed agreement
ANZCERTA	Australia New Zealand Closer Economic Relations Trade Agreement
ANZECC	Australia and New Zealand Environment and Conservation Council
ANZFA	Australia New Zealand Food Authority
ANZFSC	Australia New Zealand Food Standards Council
APEC	Asia-Pacific Economic Cooperation
ASEAN	Association of South-East Asian Nations
ATC	Agricultural Technical Cooperation
BLIS	bacteriocin-like inhibitory substances
BNP	brain natriuretic peptide
Bt	*Bacillus thuringiensis*
CAC	Codex Alimentarius Commission
CBD	Convention on Biological Diversity
CCFL	Codex Committee on Food Labelling
CCGP	Codex Committee on General Principles
CER	Closer Economic Relations [with Australia] (CER includes ANZCERTA)
CGD	chronic granulomatous disease
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CRI	Crown Research Institute
DHB	District Health Board
DIA	Department of Internal Affairs

DNA	deoxyribonucleic acid
DOC	Department of Conservation
ECOSOC	Economic and Social Council
ERMA	Environmental Risk Management Authority
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
FeLV	feline leukaemia virus
FRST	Foundation for Research, Science and Technology
GATT	General Agreement on Tariffs and Trade
GDP	gross domestic product
GMO	genetically modified organism
GST	Goods and Services Tax
GTAC	Genetic Technology Advisory Committee
hAAT	alpha-1-antitrypsin
HDC	Health and Disability Commissioner
HFA	Health Funding Authority
HHS	Hospital and Health Service
HRC	Health Research Council
HSNO Act	Hazardous Substances and New Organisms Act 1996
IBAC	Independent Biotechnology Advisory Committee
IBRD	International Bank for Reconstruction and Development
IBSC	Institutional Biological Safety Committee
ICCPR	International Covenant on Civil and Political Rights
ICESCR	International Covenant on Economic, Social and Cultural Rights
ICSID	International Centre for Settlement of Investment Disputes
IDA	International Development Association
IFC	International Finance Corporation
IPPC	International Plant Protection Convention
IPONZ	Intellectual Property Office of New Zealand
ISPM	International Standard for Phytosanitary Measures
LMO	living modified organism
MAAC	Medicines Assessment Advisory Committee
MAF	Ministry of Agriculture and Forestry

MAS	marker assisted selection
MCA	Ministry of Consumer Affairs
MED	Ministry of Economic Development
MFAT	Ministry of Foreign Affairs and Trade
MfE	Ministry for the Environment
MH	malignant hypothermia
MIGA	Multilateral Investment Guarantee Agency
MMP	Mixed Member Proportional
MOH	Ministry of Health
MORST	Ministry of Research, Science and Technology
MOU	Memorandum of Understanding
mRNA	messenger RNA
NACHD	National Advisory Committee on Health and Disability
NAEAC	National Animal Ethics Advisory Committee
NAWAC	National Animal Welfare Advisory Committee
NECHAR	National Ethics Committee on Human Assisted Reproductions
NPPO	National Plant Protection Organization
NZHIS	New Zealand Health Information Service
NZODA	New Zealand Official Development Assistance
OCR	Official Cash Rate
OECD	Organisation for Economic Co-operation and Development
OEEC	Organisation for European Economic Co-operation
OIE	Office International des Épizooties
PCE	Parliamentary Commissioner for the Environment
PKU	phenylketonuria
R&D	research and development
RCGM	Royal Commission on Genetic Modification
RMA	Resource Management Act 1991
RNA	ribonucleic acid
RPPO	Regional Plant Protection Organization
SCOTT	Standing Committee on Therapeutic Trials
SPS Agreement	Agreement on the Application of Sanitary and Phytosanitary Measures
TBT Agreement	Agreement on Technical Barriers to Trade

TGA	Therapeutic Goods Administration
TRIPS Agreement	Agreement on Trade-Related Aspects of Intellectual Property Rights
TTMRA	Trans-Tasman Mutual Recognition Arrangement
UDHR	Universal Declaration of Human Rights
UN	United Nations
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UPOV	Union Internationale pour la Protection des Obtentions Végétale
VAT	Value Added Tax
WHO	World Health Organization
WIPO	World Intellectual Property Organization
WTO	World Trade Organization

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