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New Zealand

Biotechnology - GE Plants and Animals

Annual Update for Biotechnology in Agriculture

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Report Highlights:

The New Zealand Government (NZG) maintains one of the most comprehensive and rigorous approval regimes for genetically modified organisms in the world. To date, several contained trials have been conducted in New Zealand but no organization has submitted an application for a conditional or full-scale release of a GM organism. Many attribute this to the onerous, costly and unproven nature of the GM regulatory framework, which includes a lengthy public consultation process. As the first applicant for a GM release will likely come under intensive public scrutiny and pressure from a number of different groups, some New Zealand companies have opted to go through the regulatory approval process overseas rather than in New Zealand

SECTION I. EXECUTIVE SUMMARY

GM technology remains a highly charged political issue in New Zealand with strong opposition from the Green Party and GE Free NZ. Even some commodity organizations and farmers oppose the use of genetic modification (GM) technology out of concern that it will tarnish New Zealand's "clean and green" image and negatively impact on the ability to market products overseas. However, there are signs that attitudes toward GM technology are beginning to change. Press articles have touted the need to rethink New Zealand's restrictive stance on GM technology expressing concern that the New Zealand agricultural sector will fall behind competitor countries if it doesn't embrace GM technology. Other articles have highlighted the benefits of genetic engineering in addressing environmental issues.

The GM debate in New Zealand has created a stringent regulatory environment. Genetically modified organisms (GMOs) are regulated under the 1996 Hazardous Substances and New Organisms Act (HSNO). The Act is administered by the Environmental Risk Management Authority (ERMA). ERMA operates in line with the New Zealand Government's (NZG's) cautious approach to GM technology, only approving applications if the benefits outweigh the risks. In the regulation of GM organisms, ERMA considers the effects on the environment, health and safety of people, the economy, the social and cultural well-being of people and communities, Maori culture and their relationship with the environment, and international obligations.

To date, ERMA has approved several contained trials. However, no organization has submitted an application for a conditional or full-scale commercial release of a GM organism in New Zealand. Many attribute this to the onerous, costly and unproven nature of the GM regulatory framework, which includes a lengthy public consultation process. As the first applicant for a GM release will likely come under intensive public scrutiny and pressure from a number of different groups, some New Zealand companies have opted to go through the regulatory approval process in other countries. Several New Zealand-developed GM plants are progressing through regulatory systems offshore and could be available in overseas markets in the next few years.

Despite consumer and political concerns regarding GM technology, there is ongoing research being conducted in New Zealand. Research projects include GM plants with improved characteristics for biofuel production, plants and animals modified to produce pharmaceuticals and crops modified to produce higher levels of nutrients. As an agricultural exporting nation, it is estimated that more than 50% of New Zealand's export earnings are based on grass and there is considerable research into GM forage grasses. The focus of the research is on high-impact traits that cannot be achieved through conventional breeding – traits that can reduce environmental impacts of agriculture and increase on-farm productivity. Many believe that New Zealand researchers are getting closer to needing to apply for a release of GM organisms to commercialize their products and some expect to see applications to ERMA soon.

In spite of its rigorous domestic GM regulatory framework, the NZG plays an important role internationally in securing science-based trade rules for GM products. As a party to the Cartagena Biosafety Protocol, New Zealand has worked to ensure that measures to protect the environment are not unfairly trade disruptive for GM products.

SECTION II. GM Research

The environment for GM research in New Zealand has largely been determined by a Royal Commission report dating back to 2001. The major conclusion of the report was that it would be unwise for New Zealand to turn its back on the potential benefits of GM technology but that New Zealand should proceed carefully managing the risks while, at the same time, encouraging organic production and sustainable agriculture.

Nine years on, there have yet to be any conditional or full-scale releases of GM crops in New Zealand, and there is no commercial production. However, there has been contained research using GM technology and there is an increasing recognition that genetic engineering is a useful tool in addressing environmental issues, particularly methane gas emissions from livestock. Much of the research has been conducted by crown research institutes (CRIs), which receive both public and private sector funding.

Plant and Food, a CRI, has undertaken GM research programs on a range of plants including potatoes, onions, broccoli, cabbage, and cauliflower and forage kale. However, the brassica trials were terminated after a breach of one of the field trial conditions where at least one genetically modified plant was allowed to flower.

Scion, the leading forestry CRI, has received approvals from ERMA to conduct contained field trials on GM trees. One approval was to field test genetically engineered *Pinus radiata* and *Picea abies* for herbicide resistance over nine years. Originally granted in 2001, this field trial was extended in 2009 for a further eight years. The other trial focused on genetically modifying genes to produce sterile trees.

AgResearch, New Zealand's largest CRI, has received two approvals from ERMA to conduct research on GM cows. One approval was to field test GM cattle with cattle casein genes and the other to develop transgenic cattle that can express functional therapeutic proteins in their milk. The first phase of field trial approvals expired in 2008. ERMA applied for four new approvals to continue the transgenic program for a number of species and a range of activities, including the production of biopharmaceutical proteins. However, these four applications are held up by legal action. On June 5, 2009, GE Free New Zealand won their case against AgResearch and ERMA. The Court found that the applications were too generic to enable a risk assessment of the type required by the HSNO Act. On June 29, AgResearch filed a case in Appeals Court. Hearings were held in January 2010 and the Court of Appeals overturned the ruling of the High Court. GE Free is seeking to take the case to the Supreme Court. In the interim, AgResearch is continuing to do GM work on transgenic goats, cattle and mice. The human diseases they are working on are diabetes, cancer, human infertility and blood clotting.

In June 2010, AgResearch scientists and Granslanz Technology Ltd., a subsidiary company, announced that they believe they can improve white clover (*Trifolium repens*) to give grazing animals a higher intake of protein, while at the same time reducing methane emissions. Scientists also believe the genetic breakthrough could improve animal health and reduce nitrogen waste.

The Pastoral Genomics Research Consortium, a research consortium for forage enhancement through biotechnology, is researching a cisgenics approach to develop perennial ryegrasses that are drought resistant and reduce animal methane emissions. The consortium has links with the Noble Foundation in Oklahoma and the University of Florida.

SECTION III. GM POLICY AND REGULATORY FRAMEWORK

General Policy on Genetic Modification

While the international environment with respect to GMOs has changed significantly over the last decade, the NZG's policy

on genetic modification has changed little since the Royal Commission on Genetic Modification released its report in 2001.

ERMA is the lead agency in minimizing and managing any risks associated with GMOs. Under the 1996 Hazardous Substances and New Organisms (HSNO) Act, all GMOs are prohibited entry into New Zealand unless they have been formally approved by ERMA. ERMA can issue various levels of approval including containment, conditional release and full-scale release. To date, ERMA has granted contained use approvals for research purposes but has not approved any GMOs for conditional or full-scale release. (See Appendix II for details of contained field trials and conditional releases that have been approved.)

What is containment? Containment requires that an organism and its heritable material be contained and managed within a containment facility. Containment is where basic research takes place to create or develop a GMO and to gather information to apply for a field test or release application. In New Zealand, a field test is considered contained as the organism and any heritable material cannot leave the field test site and must be retrieved or destroyed at the end of the field test. To ensure the organism is contained, ERMA implements comprehensive operational, physical or biological controls. In the case of GM animals, this could be good animal husbandry and a sturdy fence. In the case of a crop, it might be a control on flowering to prevent the release of pollen or seed.

What is a release? NZ GM regulations permit two types of releases: a release with controls (a conditional release) and a release without any controls or restrictions (an unconditional release). Release approvals can only be given if the GMO is not likely to cause: significant displacement of native species; significant deterioration of natural habitats; significant adverse effects on human health and safety; significant adverse effects to New Zealand's genetic diversity; disease or be a vector for disease.

To date, there have been no applications for conditional or unconditional releases in New Zealand. However, as a result of ongoing research in the containment phase, many expect an application for a conditional release within the next few years.

The Main Laws Governing Genetic Modification

- Hazardous Substances and New Organisms (HSNO) Act 1996
- Hazardous Substances and New Organisms (Methodology) Order 1998
- Hazardous Substances and New Organisms (Low-risk Genetic Modification) Regulations 2003
- Imports and Exports Restrictions Act 1988
- Import and Exports (Living Modified Organisms) Prohibition Regulations 2005
- Customs and Excise Act 1996
- Bio-security Act 1993 (including Ministry of Agriculture and Forestry (MAF)/Environmental Risk Management Authority (ERMA) Containment Standards; MAF Import Health Standards)
- Agricultural Compounds and Veterinary Medicines Act 1997
- Medicines Act 1981
- Food Standards Australia New Zealand Act 1991
- Official Information Act 1982

The HSNO Act

The HSNO Act regulates research into and release of all living things that do not already exist in New Zealand, including genetically modified organisms. The Act is administered by the Ministry for the Environment (MFE) but implemented by ERMA, which was established as an independent body under the Act. It applies to anything that can potentially grow,

reproduce and be reproduced, whether or not it is also a food or a medicine. Before any new organism, including a GMO, can be imported, developed, field tested or released into the environment, the applicant must get the approval from ERMA.

The Key Government Agencies Responsible for Administering and Enforcing GM Policy

Environmental Protection Agency On June 3, 2010, the New Zealand Government officially announced the creation of the new Environmental Protection Agency (EPA), which will become operational on July 1, 2011. Technical and regulatory functions that now fall under the Ministry for the Environment, Ministry of Economic Development, and the Environmental Risk Management Authority will now be brought together and consolidated under the EPA. Among other things, the EPA will be responsible for undertaking all of the functions currently performed by ERMA under the HSNO Act. The functions currently performed by ERMA that will be transferred to the EPA include the following:

- Advising the Minister of any matter relating to the purpose of the Act;
- Processing applications for approvals;
- Making decisions on applications for approvals and setting related controls;
- Monitoring and coordinating HSNO compliance and enforcement activities;
- Preparing reports for the Minister for the Environment in relation to applications that have been called in by the Minister;
- Issuing, amending and revoking group standards for hazardous substances;
- Maintaining a register relating to hazardous substances and new organisms;
- Participating in the work of international bodies dealing with hazardous substances and new organisms;
- Providing technical advice;
- Monitoring the implementation of regulations; and,
- Supporting the Maori advisory committee.

Ministry for the Environment (www.mfe.govt.nz): Currently, MFE advises the NZG on environmental laws and policies, including managing the risks of introducing new organisms. It is responsible for the management and maintenance of the HSNO Act.

Environmental Risk Management Authority (www.ermanz.govt.nz): **Currently**, ERMA is responsible for assessing and deciding on applications to introduce new organisms, including GMOs, into New Zealand, and for their development and domestic use. It is an independent, quasi-judicial decision-making agency established under the HSNO Act to make decisions on the import and domestic use of all GMOs, as well as other new organisms and hazardous substances.

Food Standards Australia New Zealand (www.foodstandards.govt.nz): FSANZ is a bi-national independent statutory authority operating under the Food Standards Australia New Zealand Act 1991. It is responsible for developing food standards for both Australia and New Zealand, emphasizing the protection of public health and safety. The standards cover composition, labeling and contaminants, including microbiological limits. They apply to all food produced or imported for sale in Australia and New Zealand, including food products that are or contain GMOs. The final approving body for standards developed by Food Standards Australia New Zealand is the Australia New Zealand Food Standards Council (ANZFSC), which is made up of the Australian Commonwealth, state and territory Ministers of Health and the New Zealand Minister of Health.

Ministry of Agriculture and Forestry (www.maf.govt.nz): MAF is responsible for enforcing the conditions for genetically modified organisms imposed by ERMA on approved field tests and conditionally released organisms. This work also

involves the inspection of containment facilities for research in containment and ensuring importers comply with the HSNO Act.

New Zealand Food Safety Authority (www.nzfsa.govt.nz): NZFSA is responsible for administering standards for safety, labeling and composition of food sold in New Zealand, including imported food and foods produced using genetic modification. NZFSA was merged with MAF on July 1, 2010. All of the functions of the two departments are expected to be fully integrated under MAF by December 2010.

Ministry of Research, Science, and Technology (www.morst.govt.nz): MORST is charged with developing New Zealand's research and innovation policies as they relate to biotechnology. Although it establishes research allocation guidelines and policies, it contracts other agencies to handle the allocation process. MORST runs a Futurewatch program to look over the time horizon for issues in science and technology that will affect New Zealand policy development. One key area MORST is monitoring is the changing nature of farming systems. MORST reports an increase in concerns around areas where GM plants and animals could have impacts, both positive and negative, including increasing demand for food, climate change, carbon emissions, involvement of multinationals and supermarkets in the food value chain, the rise of new pests and diseases, increases in salinity from irrigation, equitable resource management and ethical concerns over animal management.

Foundation for Research Science and Technology (FRST): FRST is the main distributor of Government funding in New Zealand. It is charged with investing in innovation and fostering the creation of new knowledge.

The Approval Process for GMOs

All decisions on the importation and domestic use of living modified organisms that are genetically modified are made by ERMA on the basis of a thorough assessment of the potential risks and benefits posed by the organisms, under the requirements of the 1996 HSNO Act. If approval is given for development in containment, further approval must be given before the organisms can be field tested, conditionally released or fully released. Approval is only given if, in the opinion of ERMA, the benefits of the GMO outweigh the risks.

Under the HSNO Act, ERMA must evaluate the potential risks of new organisms according to strict minimum standards. The HSNO Act requires that the following matters be taken into account by decision makers:

- the sustainability of all native and valued introduced flora and fauna;
- the intrinsic value of ecosystems;
- public health;
- the relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu (sacred places), valued flora and fauna, and other taonga (sacred or treasured things);
- the economic and related benefits and costs of using a particular new organism; and
- New Zealand's international obligations.

When considering a new organism for conditional or full release, ERMA must first decide whether or not the organism would be likely to have any significant effect on the environment or human health and safety. ERMA then looks at any potential economic and other benefits and weighs these up against the risks. The cost/benefit analysis provides a basis for the final decision on whether or not any organisms should be released. Under a conditional release, ERMA stipulates certain

conditions such as restrictions on where GM crops can be grown, compulsory buffer zones between the GM crop and conventional crops, regulations on planting time, or controls on how the crop is harvested and processed. In the case of GM animals, conditions could include high security fencing and requirements for disposing of waste. Under a conditional release scenario, MAF is responsible for enforcing compliance. ERMA can grant a full release if there are no potential risks that need to be managed by the imposition of conditions. ERMA's decision to approve or decline an application can be appealed by the High Court. If the application goes ahead, conditions are monitored and enforced by MAF.

Consultation with the public is an integral component in the case-by-case decision-making process. The HSNO Act requires ERMA to publicly notify applications where it considers there is likely to be significant public interest in the application. The public notice provides a means by which any person may make a written submission in the application. A public hearing of an application may also be held if one is requested by the applicant, by a person who has made a submission, or if ERMA considers that a hearing is necessary to ensure due consideration of all the relevant matters.

It's worth noting that New Zealand is unique in its requirement that the benefits must be considered alongside the risks. The United States and Australia base decisions only on the potential biophysical risks and the ability to manage risks. For field trials, many report that New Zealand's requirement for absolute containment is difficult to meet and that the need for public consultation for contained field trials is costly.

In line with recommendations from the Royal Commission, the HSNO Act was amended to give greater recognition to the knowledge and experience of Maori values by those involved in the decision making process on new organisms, including GMOs. When applications for the release of GMOs in New Zealand are considered by ERMA, the HSNO Act requires ERMA to take into account the relationship Maori and their culture and traditions have with their ancestral lands, water, sites, flora and fauna. This means that ERMA must assess the potential impact of the organisms on indigenous plants and animals – as well as introduced ones – that are valued by the Maori.

Treaty of Waitangi and Genetic Modification

New Zealand's Royal Commission on Genetic Modification investigated the Crown's responsibilities under the Treaty of Waitangi in relation to genetic modification issues. They recommended that the HSNO Act be amended to give effect to the principles of the Treaty of Waitangi.

The Government agreed to amend the HSNO Act to more appropriately reflect the Treaty of Waitangi relationship and in 2002 set up a Māori Reference Group to assist with this. The Government considered the Māori Reference Group's report, along with the advice of officials, and decided to make legislative changes to the Act, and also to introduce practical changes to the way the application and decision-making processes work.

The HSNO Act has been amended to give greater emphasis to the knowledge and experience of Māori values by those involved in the decision making process on new organisms, including genetically modified organisms. It does this by adding knowledge of the Treaty of Waitangi and tikanga Māori to the range of expertise and experience the Minister considers when appointing members of the Authority. As well, Nga Kaihau Tikanga Taiao (the body that advises the Environmental Risk Management Authority on Māori issues) is given a statutory basis within the Act. Previously there was no requirement in law for ERMA to have a Māori advisory committee, but this has been changed to make it mandatory.

Contained GM Field Trials

Since the HSNO Act was implemented in 1996, New Zealand has approved 17 applications for GM outdoor field trials. The most recent was in April 2008, when the former Crop & Food Research submitted an application to ERMA to undertake a

field evaluation of GM onions, spring onions, garlic and leeks over a ten-year period on approximately 2.5 hectares. In response to this application, ERMA received 123 submissions from community groups, Maori groups, scientists and members of the public. This is a lot less than the 1,933 submissions received regarding CFR's previous GM onion application in 2003. There is currently an application to field trial GM goats, sheep and cattle under consideration. No applications for full release of GM plants or animals have been made and New Zealand primary production is still effectively GM free. A complete listing of the field trials being conducted in New Zealand can be found in Appendix II. Unlike Australia and the United States, fees are charged in New Zealand for applications for field trials.

Some New Zealand companies have opted to take their GM trials offshore. A number of groups feel that the New Zealand regulations are too expensive or onerous and they are better able to conduct their trials overseas, particularly in Australia and the United States. .

GM Food Regulations

GM foods and ingredients can only be sold in New Zealand if they have been assessed for safety by FSANZ and approved by the Australia New Zealand Food Standards Council (ANZFS), a council of Australian and New Zealand Health Ministers. Although FSANZ has approved 43 GM processed products for sale in New Zealand and another six are in the pipeline, supermarkets have a stated policy not to offer GM products for sale.

As of 2001, all genetically modified foods sold in New Zealand must be labeled. This means that any food, food ingredient, food additive, food processing aid or flavoring that contains genetically modified DNA or protein must have this fact noted on the label. If a food or ingredient has altered characteristics, this must also be on the label. For example, if oil was made from a plant that had been genetically modified so that its oil boils at a higher temperature, the oil would have to be labeled, even though no genetically modified material would be present. A genetically modified ingredient does not have to be listed on the label when:

- It is a flavoring in the food and makes up less than 0.1% of that food; or
- An ingredient unintentionally contains genetically modified material at levels of less than 1% of that ingredient.

Meat and other products from animals that have been fed GM food do not need to be labeled as genetically modified. Also, there are no labeling requirements for foods prepared in restaurants, as takeaways or at supermarkets.

Standard A18/1.5.2 of the Australia New Zealand Food Standards Code outlines the legal requirements for the sale and labeling of GM food. Negative content labeling such as "GM Free" is not addressed as part of the labeling standard.

Meeting the requirements of New Zealand's GM food labeling regulations places a burden on manufacturers, packers, importers, and retailers to take reasonable steps to determine if the food is genetically modified or has a GM ingredient and to ascertain if the GM food is approved. The importer usually has the primary responsibility for ensuring the accuracy of the label and compliance with New Zealand's GM food labeling requirements. Wholesalers and retailers usually demand GM-free declarations from their supplier/importer, which passes liability in the event of GM labeling non-compliance back to the importer. New Zealand food legislation requires businesses to exercise due diligence in complying with food standards. Meeting those obligations is usually interpreted to require a paper or audit trail similar to a quality assurance system.

NZFS does not inspect individual food import shipments for compliance with GM food labeling requirements. Periodic compliance audits conducted by NZFS usually start by selecting a number of items from retail shelves and working back to the local manufacturer or the importer of record. For imported food, this largely consists of a review of importer compliance with their responsibility to adequately document the GM content of their food imports based upon information

obtained from overseas exporters/manufacturers, and that food product labels indicate GM content if necessary.

GM Animal Feed Regulations

Regulatory approval is not required to feed GM feed to animals. This is covered by the Agricultural Compounds and Veterinary Medicines (ACVM) regulations 2001, which are issued under the ACVM Act (1997). The ACVM regulations state that materials fed to animals should be safe and not cause harm to the animal. A distinction between GM and non-GM feed is not defined. When imported, animal feed gains entry to New Zealand under its general import health standards, with no distinction made between GM and non-GM animal feed.

The current approach taken by FSANZ recognizes that many animal feeds are derived from the same GM commodities (e.g. corn) that are used for human consumption, and, as a result, it is difficult to keep the food and feed chains completely separate. FSANZ's policy is to avoid "split use" approvals, where a GM plant receives approval for use as animal feed but not for human food. This approach, which is also practiced in the United States and Canada, arose following an incident in the United States where traces of a GM corn (known as StarLink™ corn), which had been approved for animal feed only, were found in human food products. The incident caused consumer concern and disruption to trade and highlighted that adventitious contamination can occur despite well developed identity preservation and segregation systems being in place. To prevent similar incidents occurring in the future it is now common practice for GM plants intended primarily for feed use to also undergo food safety assessment and approval for human food use. This policy is intended to minimize the risk of unassessed and unapproved products entering the food supply as a result of inadvertent co-mingling of grain/seeds during transport and storage, and also ensures that their use as feed will not pose indirect risks to humans. Examples of GM crops that have been developed primarily for animal feed but which have also been granted approval as human foods in Australia and New Zealand include high lysine corn, and herbicide-tolerant lucerne.

Cartagena (Biosafety) Protocol

The Cartagena Protocol on Biosafety entered into force for New Zealand on May 2005, following New Zealand's ratification of the agreement in February 2005. The protocol regulates the trade of living modified organisms. New Zealand was already assessing genetically modified organisms before importation into New Zealand on a case-by-case basis and ratified the protocol to be a 'good international citizen'. Several industries, however, such as the dairy sector, are concerned that the EU or other countries might use the "precautionary principle" to restrict trade.

New Zealand is one of the few major agricultural exporters that are a signatory to the Cartagena Protocol. The NZG tends to have a similar stance on issues in the Protocol as the United States. Both countries are concerned about liability and redress, handling, transport, packaging and identification issues relative to living modified organisms (LMOs) as well as potential conflicts with other international obligations. As a result, New Zealand has become an ally of the United States at Biosafety Protocol meetings and plays a critical role in helping to shape more balanced decisions at Protocol meetings.

SECTION IV. GM MARKETING ISSUES

Biotechnology continues to be a politically sensitive subject in New Zealand that evokes strong opposition from the Green Party as well as a small number of NGO organizations often with influence out of proportion to numerical support. These groups seek to prevent commercial releases of genetically modified organisms into the environment as well as to impose restrictions against consumption of foods with GM content.

New Zealand consumers are usually cautious when purchasing GM foods and have tended to avoid such foods but such attitudes may be weakening. Many New Zealand farmers support the commercialization of appropriate GM varieties of crops in New Zealand and have expressed concern that, by not embracing GM technology, they are falling behind their competitors. They are, however, cautious in their approach. Before making planting decisions, most would want assurances that there would be marketing opportunities for GM crops. Some agricultural industry associations in New Zealand oppose the adoption of GM crops because of the concern that it will tarnish New Zealand's clean and green image and negatively impact on their ability to market products abroad.

APPENDIX I. REFERENCE MATERIAL

The Environmental Risk Management Authority – regulator under the HSNO Act

www.ermanz.govt.nz

The Ministry for the Environment – administers the HSNO Act

www.mfe.govt.nz

Food Standards Australia New Zealand – developed the safety and labeling standards, and undertakes any safety assessments, for GM foods

www.foodstandards.govt.nz (Click on “Food standards Code” then section 1.5.2)

New Zealand Food Safety Authority – responsible for food safety and suitability standards/implementation/compliance/enforcement in New Zealand

www.nzfsa.govt.nz

Biosecurity New Zealand – part of the Ministry of Agriculture and Forestry responsible for imports into New Zealand

www.biosecurity.govt.nz

Ministry of Research, Science and Technology – implements the Government's research strategy and regulations

<http://www.morst.govt.nz/current-work/biotechnology/>

Foundation of Research, Science and Technology – contracted by MoRST to allocate the majority of Government funding for research

www.frst.govt.nz

Searchable database listing research projects that FRST has contributed funding to

<http://www.frst.govt.nz/database/reports06/index.cfm>

NZbio – an incorporated society tasked with assisting the growth of New Zealand's biotech sector

www.nzbio.org.nz

New Zealand Trade and Enterprise – assists and promotes New Zealand businesses

www.nzte.govt.nz

Biotechnology learning hub

<http://www.biotechlearn.org.nz/>

New Zealand's Bioethics Council

<http://www.bioethics.org.nz/>

A list of New Zealand's Crown Research Institutes

<http://www.ccmaw.govt.nz/crown-research-institutes.html>

New Zealand's Biotechnology Strategy

<http://www.morst.govt.nz/publications/a-z/n/nz-biotechnology-strategy/>

Full Text of the Hazardous Substances and New Organisms Act (1996)

<http://www.legislation.govt.nz/>

(Select under 'Statutes')

Video for Ovine SNP50 Beadchip breakthrough

<http://www.youtube.com/watch?v=hoHv3E6FmCQ>

APPENDIX II. GM FIELD TRIAL APPLICATIONS

The table below lists the applications to field test a GM organism lodged with ERMA under the HSNO act since 1998. For more information on these applications, go to <http://www.ermanz.govt.nz/search/registers.html>.

Code	Applicant	Description	Purpose	Status
GMF98009	AgResearch	GM Cattle	To field test, in Waikato, cattle genetically modified with cattle casein genes or the human myelin basic protein gene, or deletion of the cattle lacto globulin gene. Milk may have enhanced nutritive value or be valuable as a drug for multiple sclerosis.	Part 1 Completed. Animals are being held until a new approval is in place. Part 2 still active.
GMF99001	Scion	GM Pine Trees	To field test, in the Bay of Plenty (Rotorua), over a period of 20 years, Pinus radiata plants with genetic modifications to the genes controlling reproductive development. The total duration of this project including a post-trial monitoring phase is 22 years.	This field test has been completed and in post-harvest monitoring
GMF99005	Scion	GM Pine Trees	To field test, in the Bay of Plenty (Rotorua), over a period of 9 years, Pinus radiata and Picea abies plants genetically engineered for herbicide resistance. The total duration of this	This field test has been completed and in post-harvest monitoring

			project is 11 years.	
GMF03001	Crop and Food Research	GM Onions	To field test onions modified for tolerance to the herbicide glyphosate, and to evaluate their environmental impact; herbicide tolerance; agronomic performance; development as cultivars and equivalency to non-genetically modified onions.	This field test has been completed
GMF06001	Crop and Food Research	GM Vegetable and Forage Brassicas	To assess the agronomic performance, in the Lincoln region, over 10 years of vegetable and forage Brassicas, specifically cabbage, broccoli, cauliflower and kale, modified for resistance (modified to contain genes derived from <i>Bacillus thuringiensis</i>), to caterpillar pests like cabbage white butterfly and diamondback moth.	This field test has been suspended because of breach of controls
GMR07001	New Zealand Racing Board	GM Equine influenza vaccine	To gain approval to import for release genetically modified vaccines (Proteqflu and Proteqflu Te) to protect horses against Equine Influenza	Approved for conditional release – emergency use
GMF06002	Crop and Food Research	GM Alliums	To field test over 10 consecutive years, the vegetable alliums species onion, garlic and leek with genetically modified agronomic and quality traits in order to assess their performance in the field and investigate the environmental impacts of these plants	Approved but it has not been activated
GMD02028	Ag Research	GM Cattle	To develop transgenic cattle that can express functional therapeutic foreign proteins in their milk and to develop transgenic cattle to study gene function and genetic performance.	Still Active
GMF98002	Crop and Food Research	GM Petunia	To assess the field performance of vegetative plants - Petunia genetically modified for altered plant form or pigmentation.	Completed
GMF98004	Betaseed Inc.	GM Sugar Beet	To evaluate agronomically important characteristics of herbicide tolerant (phosphinothricin resistant) sugar beet (<i>Beta vulgaris vulgaris</i>).	Completed
GMF98011	Carter Holt Harvey	GM Trees	To field test, in Waikato, pre-reproductive <i>Pinus radiata</i> , in order to study factors influencing gene expression and to assess the influence of genetic modifications, involving the insertion of marker genes, on the growth and morphology of trees.	Completed
GMF98007	Crop and Food Research	GM Potatoes	To field test, in Canterbury over 5 years, potato cultivars genetically modified for increased resistance to bacterial soft rots, to evaluate resistance and yield performance of individual lines.	Completed
GMF98008	Crop and Food Research	GM Potatoes	To field test, in Canterbury over 5 years, potato cultivars genetically modified for increased resistance to potato tuber moth, to evaluate resistance and yield performance of individual lines.	Completed
GMF98001	PPL Therapeutics (NZ) Ltd	GM Sheep	GM sheep for purpose of producing a biopharmaceutical (human alpha-1-antitrypsin, hAAT).	Ceased Operation
GMF99004	Ag Research	GM Sheep	GM sheep, with an inactivated myostatin gene, to increase the understanding of myostatin function in order to identify the effects on sheep muscularity.	Ceased Operation
GMF98005	Pioneer NZ Ltd	GM Maize	Import and field test GM maize modified for tolerance to glufosinate-ammonium herbicide, for breeding purposes, in Waikato.	Unused due to Company Closure
GMF98006	Pioneer NZ Ltd	GM Maize	Import and field test GM maize modified to contain CryIA(b) protein from <i>Bacillus thuringiensis</i> to confer resistance to lepidopteran insects, for breeding purposes, in Waikato.	Unused due to Company Closure
ERMA200223	AgResearch	GM Goats, sheep and cattle	To develop in containment genetically modified goats, sheep and cows to produce human therapeutic proteins, or with altered levels of endogenous proteins for the study of gene function, milk composition and disease resistance	Under consideration by ERMA