

Vested Interests and Business Diplomacy biotechnology companies and gene editing in New Zealand

Abstract

New Zealand is known worldwide for its green image and environmentally friendly products, including a GMO-free status. However, recent advances in biotechnology suggest that new technologies, such as gene editing, may help to combat climate change and contribute to sustainability. Debate about whether to allow the use of gene editing in the dairy, farming and livestock industries in New Zealand has begun because of vested interests in new technologies from multinational corporations, the dairy industry and the government. In New Zealand, companies utilise business diplomacy strategies in order to promote their corporate interests and participate in multi-level networks of influence and information. This article identifies the main stakeholders in gene editing, their roles in a multi-level network of vested interests, and their uses of business diplomacy in New Zealand.

Keywords business diplomacy, gene editing, biotechnology, GMOs, vested interests

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There is worldwide concern about protecting the environment while feeding a growing global population. The United Nations projects the world population to be around 9.8 billion by 2050 (UN DESA, 2017), which poses challenges to food supply and nutrition. New Zealand, a top producer of livestock and dairy, may contribute to solving the problem of feeding the world's population in 2050. To increase productivity while reducing CO₂ emissions produced by farming, agricultural biotechnology, genetically modified organisms (GMOs) and gene editing may be promising tools.

Gene editing is a type of genetic engineering in which part of the genome is cut to alter, remove or change a specific expression of a gene (Royal Society Te Apārangi, 2019b). One of the main tools of gene editing is CRISPR (clustered regularly interspaced short palindromic repeats). Gene editing is closely related to genetic modification because of the alterations done in genomics. However,

scientifically gene editing differs from genetic modification, in which a gene from another species, generally a bacterium, is introduced into a genetically modified organism to generate a specific expression, such as resistance to herbicides. Hence, biotechnology companies and some scientists and institutions claim that gene-editing technology is not genetic modification. Other groups and organisations consider that gene editing is still a form of genetic modification and are concerned about possible effects to the environment and human health. They consider gene-edited products to be GMOs. These differences in opinion have started a worldwide debate around gene editing (Harmon, 2015; Montenegro, 2016; Plumer et al., 2018).

Countries that favour GMOs, such as the United States, Canada, Australia and Brazil, have adopted the 'substantial equivalence' principle, which considers GMOs equal to their counterparts. In contrast, the European Union, Norway and Switzerland have adopted the 'precautionary principle', with a stricter traceability system and mandatory labelling. Similar approaches have been taken towards gene editing. In 2018, the US Department of Agriculture stated that it would not regulate gene-edited plants. Similarly, in April 2019, Australia's Office of the Gene Technology Regulator ruled that the use of gene editing to produce plants, animals and human cells that does not introduce new genetic material will not be regulated (Mallapaty, 2019). In contrast, in July 2018 the Court of Justice of the European Union ruled that crops produced with gene editing should be regulated as GMOs.

In New Zealand the regulation of GMOs has not changed since 1996. The Hazardous Substances and New Organisms Act 1996 prevents the cultivation of GMOs other than for laboratory experiments. However, science has evolved, and some local groups favour gene-editing technology. Crown research institutes such as Plant and Food Research, BioHeritage, the Royal Society Te Apārangi and AgResearch have suggested that New Zealand should update its legislation to accommodate CRISPR developments (AgResearch NZ, 2018; Royal Society Te Apārangi, 2019a). The University of

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Canterbury has suggested that New Zealand is missing economic and sustainability opportunities by not utilising this technology. Fonterra supports research on alternative protein meat made of gene-edited material to curb CO₂ emissions from livestock production overseas. All these groups have vested interests in gene editing and a common goal of advancing New Zealand's economic growth. But do they also utilise their economic strength and political influence to shape public policy and regulations in ways that meet their own particular interests?

In order to change regulations and advance common goals, powerful groups have vested interests, and with the help of various strategies, such as business diplomacy, they may advance their own interests. Business diplomacy refers to firms managing and influencing stakeholders in a host country to achieve higher reputation and profit goals, alliances, and a positive political environment, employing instruments such as media releases, educational material, conferences and seminars, awards and research centres (Martínez Pantoja, 2018a). Hence, business diplomacy creates international and local

alliances between stakeholders, built on shared interests, that augment the influence of the corporation in a positive way (Kesteley, Riordan and Ruël, 2014). Some of the tasks that are managed by business diplomacy are negotiation, renegotiation, compromises and adaptations with local authorities (Saner, Yiu and Sondergaard, 2000). Consequently, the use of business diplomacy assists in the management of local alliances and the creation of multi-level networks that are key to advancing vested interests.

The different levels of networks of influence and information for gene editing consist of multinational corporations, national companies and other public participants. All these stakeholders share a concern about climate change and an interest in the use of gene editing to fight it. They promote a better environment and giving New Zealand better chances to compete in the global arena. In this article I will first analyse biotechnology companies and some of their instruments of business diplomacy implemented in New Zealand. Second, I will examine the interests of national companies in gene editing. Then, I will explain the levels of networks, including industry associations, the government, and public organisations that also have shared interests in gene editing for the prosperity of New Zealand.

Biotechnology companies in New Zealand

Biotechnology companies have passed through a series of mergers and acquisitions. By 2017 this business sector was concentrated into four participants: DowChemical and DuPont, ChemChina and Syngenta, Bayer and Monsanto, and BASF. All of them operate in New Zealand, but BASF does not have gene editing or GMO products in this market.

Syngenta

Syngenta engages globally in research and development and its programme of corporate social responsibility includes climate change. This company has been active in genome editing for more than ten years, and by 2017 it had licenced CRISPR Cas9 and Cpf1 gene-editing technology for agriculture. The commercialisation of its gene-editing technology depends on regulations, so it is concerned about the

European Court of Justice subjecting gene editing to GMO regulations, implying more costs (Syngenta, 2018b).

As a form of business diplomacy, the Syngenta Connections programme in the Asia–Pacific supports students to visit countries in the Asia–Pacific region in order to learn about different farming practices and challenges. The 2017 programme included two students from New Zealand (Syngenta, 2017). Syngenta also has the Syngenta Growth Awards, in which sustainability researchers are recognised. Jim Walker of Plant and Food Research in Hawke’s Bay received an award for the use of pesticides in 2018 (Syngenta, 2018a). Syngenta also has a partnership with Plant and Food Research as part of its Operation Pollinator. These instruments help to build long-term relationships and multi-level networks of influence and information.

Bayer

At a global level, Bayer supports research and development in plant breeding through gene editing. Bayer believes that this technology may promote plant diversity and genetic diversity, and that the product should be regulated, not the technique (Preuss, 2018). It argues that plant breeding can be a solution for climate protection and affordable food for an increasing population. Bayer has implemented a biennial Youth Ag Summit, with two participants from New Zealand attending in 2017 and one in 2019 (Bayer Crop Science New Zealand, 2017). This is part of Bayer’s Agriculture Education Program to encourage young people to learn about sustainable agriculture. Bayer has also participated in the New Zealand Innovation Awards, in which the Spring Sheep Milk Company was nominated for innovation in 2017. These activities are implemented by Bayer to build networks, promote its products, and disseminate ideas on sustainability which align with its corporate interests.

Corteva Agriscience

DuPont Pioneer, DuPont Crop Protection and Dow AgroSciences evolved over the 2010s into what is now Corteva Agriscience. This company is a leader in the development of gene-edited products. It is

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considered a pioneer in the use of CRISPR for the development of agricultural products, including soybeans, sorghum, corn and canola (Corteva Agriscience, 2019). Gene editing in agriculture aims to feed a growing population and provide healthier food. In New Zealand, Corteva Agriscience supports the Taranaki Science Fair for students from 30 intermediate and secondary schools around the country, which helps it project a better image and a sense of corporate social responsibility.

Dairy industry

At a domestic level, the dairy industry has shared interests in gene editing in order to be more productive and sustainable. The dairy industry is interested not only in surviving and growing economically, but also in leading innovation.

Fonterra

Fonterra supports genetic modification, given the value this technology may offer for the environment, biosecurity and animal welfare (Fonterra Co-operative Group, 2018). However, this company acknowledges New Zealand’s GM-free status under current regulations, and the company emphasises that its products do not contain GMOs. Nonetheless, Fonterra is interested in the development of healthier and more sustainable products through

genetic engineering. For example, in early 2019 it invested in Motif Ingredients, a biotech start-up located in Boston which develops laboratory-grown meat with gene-editing technology (Flaws, 2019).

Other international stakeholders share an interest in the development of alternatives to meat protein, including Gingko Bioworks, the Louis Dreyfus Company, Viking Global Investors and Breakthrough Energy Ventures. These firms are investors in Motif Ingredients along with Fonterra. Breakthrough Energy Ventures is a fund supported by billionaires such as Bill Gates and Jeff Bezos (Gibson, 2019). Bill Gates, through the Bill and Melinda Gates Foundation, supports genetic engineering and innovation. Moreover, the Bill and Melinda Gates Foundation and the Rockefeller Foundation are promoters of the green revolution and support GMOs. For example, in Mexico these foundations support the International Centre for the Improvement of Maize and Wheat, which has promoted the introduction of GMOs into Mexico (Martínez Pantoja, 2018b). Consequently, the Bill and Melinda Gates Foundation has become influential in the areas of genetic engineering, health and poverty alleviation, having access to politicians and scientific and business elites. This philanthropic influence on global agricultural policy aims to promote certain ideas and pursue corporate diplomacy (Martens and Seitz, 2015).

Industry associations

Another way to build networks and extend influence is to belong to industry associations. Firms group together with like-minded organisations in specialised trade associations to advance shared goals (Rowlands, 2001). Biotechnology companies share interests in the promotion of agricultural biotechnology and the removal of regulations inhibiting innovation (Falkner, 2009). In addition to having public relations representatives, they join industry associations to better represent themselves in front of governmental agencies and society. Industry associations have the advantage of disseminating technical knowledge and promoting scientific events without the stigma of the company’s name.

BIO and its subsidiaries

BIOTech New Zealand, previously known as NZBIO, is a subsidiary of BIO International, which is an industry association that promotes biotechnology and represents biotechnology organisations and research centres, with a global network in 30 countries. BIOTech New Zealand's aim is to maximise capabilities in science and technology and create a stronger economy by embracing opportunities offered by biotechnology (BIOTechNZ, 2019a). BIOTech New Zealand supports agricultural biotechnology and has urged New Zealand to adopt a new biotechnology strategy because the global biotechnology market is expected to be worth US\$727 billion by 2025 (BIOTechNZ, 2019b). On gene editing, its executive director, Zahra Champion, has expressed her disappointment to the minister of conservation over the government forbidding the use of this technology to fight predators in New Zealand.

NGOs

Non-governmental organisations (NGOs) are relevant because they give legitimacy to governmental activities. Additionally, some NGOs enjoy popularity and their activities concentrate on practical matters or specific causes, in contrast to political parties (Castells, 2008). NGOs also perform proactive consultation to ensure the legitimacy of policy decisions (Saner and Yiu, 2008). Hence, NGOs are a source of credibility and they may foster cooperation towards common interests, along with building a broader network of influence.

Pure Advantage

Pure Advantage, a research charity in New Zealand which promotes green growth, supports gene editing, biotechnology and new food technologies. Rosie Bosworth, a future foods specialist with Pure Advantage, claims that the agricultural industry is already being disrupted by start-ups that develop lab meat, and that the future of food technology is in non-meat lab-based protein. Hence, the public and private sectors need to invest in this area to create a more sustainable industry and to be more competitive in food production and agriculture (Bosworth, 2016). She also endorsed Fonterra's sponsorship of Motif

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Ingredients, despite the criticism the firm received for supporting gene editing.

Government departments and Crown research entities

Businesses' agendas advance further when companies share vested interests with the government by collaborating and creating partnerships. In the case of gene editing, there are government agencies interested in biotechnology.

Ministry of Business, Innovation and Employment

The Ministry of Business, Innovation and Employment has not presented an official statement on gene editing. However, it has funding for science and development in biotechnology. The 2019 Endeavour Round included a project to modify brushtail possum fertility using gene editing. A report titled 'Current land-based farming systems research and future challenges' analyses the possible applications and potential of gene editing and how this technology is regulated.

Plant and Food Research

This institute has a clear policy regarding

genetic modification. This technology is used only for confined experiments with the purpose of enhancing the existing horticultural, arable, seafood and food and beverage industries in New Zealand, and to contribute to economic growth and the environmental and social prosperity of the country (Plant and Food Research, 2018). The Operation Pollinator partnership combines the expertise of Plant and Food Research in identifying associations between plant species and insects, and the know-how of Syngenta in enhancing biodiversity, increasing the effectiveness of pollinators, and improving crop yields, sustainable farming and environmental stewardship (Plant and Food Research, 2019). This partnership allows a more extended network of cooperation towards biotechnology applications.

BioHeritage Challenge

This agency oversees protecting New Zealand's biodiversity through partnerships and research innovations. Its director, Andrea Byrom, has stated that a possible solution for pest control could be gene editing or gene silencing, as long as it is cheaper than traditional pest control per hectare. But any new genetic technology must be subject to public consultation (Biological Heritage, 2017). Hence, this agency is interested in gene editing if it is accepted by the public.

AgResearch

This agency has not implemented gene editing directly. However, it employs genomics-based research tools in order to improve growth rate, health, meat and milk production, and fecundity, and to reduce the use of chemicals in livestock (AgResearch NZ, n.d.). Tony Conner, Forage Science Group Leader and a supporter of forage genetics, considers that a public discussion about gene editing applications in food production in New Zealand is necessary (AgResearch NZ, 2018).

The Royal Society Te Apārangi

In October 2018 the Royal Society released a document discussing the benefits of gene-editing technology, its differences from GMOs, its potential for important industries in New Zealand, such as honey,

dairy, agriculture and livestock, and the effects on the environment. The Royal Society's panel calls for the revision of gene-editing technology regulations and for there to be a wide public discussion to explore and assess gene editing to maintain biodiversity, the environment and primary industry, including kaupapa Māori (Royal Society Te Aparangi, 2019a). This agency is the most important one promoting gene editing and inviting stakeholders to start a discussion on how gene editing may benefit New Zealand.

University of Canterbury

Emerita professor and plant biologist Paula Jameson from the University of Canterbury considers that New Zealand should re-evaluate gene editing for the improvement of crop production and the possible benefits for sustainability in agriculture and the environment. Countries such as the United States, Australia, Canada, Argentina, Japan and Brazil are already accepting gene editing with no major regulatory oversight (University of Canterbury, 2019). There is

a concern that New Zealand is left being behind in science and research, so she recommends reconsidering gene editing.

Conclusion

Gene-editing applications for specific purposes, such as cow's milk free of allergens, can be beneficial for the economic growth of the country. This would boost the dairy industry to make farmers more competitive. However, genetically modified foods and gene-edited products are not accepted in some premium markets and may not solve all the environmental problems that we face today. Regulations still need to incorporate kaupapa Māori, consumer perceptions, the possible effects on the environment, and New Zealand's image abroad: as clean, green and GMO-free, or as a gene-editing proponent and innovator. A lot more public consultation is required before this new technology is adopted.

Biotechnology companies have influenced the regulation of GMOs internationally, inserted representatives in international bodies to influence decisions,

and persuaded governments to relax regulations. A similar scenario may be predicted for gene-editing regulations, in which some of the same stakeholders interact with and exercise their diplomatic skills to influence regulators. More importantly, with all these vested interests in gene editing, it is worth asking the following questions: to what extent will this gene-editing technology be developed by public research institutions for the use and profitability of the private sector? To what extent should the private sector receive support from the government, at public expense, to advance its corporate interests? What will be the direct benefits for farmers, the environment, and overall for New Zealand? We live in an era of rapid technological change. Sooner or later this issue will become a political controversy, and some vested interests will promote gene editing as a tool to address the climate crisis and to help New Zealand thrive.

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