



3/12/2018

To the Royal Society Te Apārangi.

Dear Dr Rands

The InterChurch Bioethics Council (ICBC) is an ecumenical cross-cultural body supported by the Anglican, Methodist and Presbyterian Churches of Aotearoa New Zealand. ICBC members have expertise and knowledge in science, ethics, theology, medicine, education and mātauranga Māori (Māori knowledge). We appreciate the opportunity to comment on the discussion paper 'The use of gene editing technology in primary industries'. As your paper identifies, there are many possibilities for this new technology to be used in a range of fields, and the pace of change and application is rapid – what you call a “revolution”. We agree about the potential for significant benefits, but also advise rigorous research and multilateral consultation on the potential significant risks of gene editing in primary industries. The ICBC wishes to raise a number of issues that we feel have not been addressed in this discussion paper:

1. Has the attitude to genetic modification, ie gene editing, changed in New Zealand?

Underlying much of the discussion paper is a positive view of potential beneficial outcomes. However, the paper does not mention that, since the 2002 Royal Commission on Genetic Modification and the resulting HSNO Act, New Zealand has taken a cautious approach to genetic engineering. The proposed use of gene editing technology appears to undermine or stretch our current legislation, without sufficient open public discussion on our current attitudes, and any movement of those attitudes, to such technology. Therefore, we believe a key question that should precede your discussion paper is “has the attitude to genetic modification/gene editing changed in New Zealand?” Research at the time of the Royal Commission identified that, within New Zealand, there was a greater acceptance of biotechnology for biomedical use compared to other uses such as environmental or agricultural applications.¹ It is essential that the full views and concerns of a fully informed general public are listened to and addressed before this new era of gene editing technology is used even for a single case. Such views need to be elicited through genuine engagement with Iwi and local communities in their own settings.

2. Lack of focus on cultural, ethical and spiritual issues. We would remind the Royal Society that, within New Zealand legislation, bioethical decisions are made with

¹ Eichelbaum *et al.*, *Report of the Royal Commission on Genetic Modification*, 239-240. Cook *et al.*, "New Zealand Public Acceptance of Biotechnology," 27-29 and 66. Lesley M Hunt, John R Fairweather, and Fiona J Coyle, "Public Understandings of Biotechnology in New Zealand: Factors Affecting Acceptability Rankings of Five Selected Biotechnologies," in *AERU Research Reports no. 266* (Christchurch: Lincoln University, 2003), 96-98 and 125.

regard also to cultural, ethical and spiritual issues, as well as the economic and legal issues emphasised in your discussion document. The origin of this position is found in the Royal Commission on Genetic Modification which included a recommendation to extend the “Hazardous Substances and New Organisms” legislation (HSNO, section 68) to include ‘cultural, ethical and spiritual issues’ as grounds for ministerial jurisdiction. This recommendation developed because concerns within these three areas ‘underlay much of what we heard about genetic modification and biotechnology’,² and was included in the 2003 “New Organisms and Other Matters Bill” (NOOM) which sought to redress deficiencies in the HSNO Act. As a result, the Minister for the Environment obtained “call-in powers” based on *cultural*, economic, environmental, *ethical*, health, international and *spiritual* concerns,³ (italics ours). In particular, we note spiritual considerations were not addressed at all in your discussion paper.

3. **A relational view of the environment is needed.** The approach of your discussion paper identifies five specific and diverse cases for which gene editing could be a solution. A problem with this approach is that gene editing can become the band-aid or quick-fix on a case-by-case basis, without full consideration of the overall relational and therefore environmental impacts. For example, scenario one talks of reducing the environmental impact of introduced wilding conifers using gene editing to produce sterile trees. However, the proposed solution is to introduce a gene edited species into the environment – replacing one foreign species with another species for one biological reason but not exploring potential changes in surrounding ecological and environmental relationships. This ‘relational view of the environment’ where one species exists within a number of ecological relationships is particularly significant within spiritual perspectives. Even when it seems difficult to fully predict and determine the web of relationships that may be affected by gene editing a species, a rigorous exploration of all possibilities must be carried out and communicated with the public.
4. **Risk of horizontal gene transfer in ecological systems.** Scenario two talks of reducing the environmental stress of endophyte fungi in perennial ryegrass on livestock by gene editing the fungi. There are significant concerns throughout many scientific fields about the possibility of horizontal gene transfer from modified organisms to other organisms in the environment (especially from fungi and bacteria to plants), with unintended and long term ecological consequences. As well as genetic containment, the movement and impact of these particular modified fungi outside perennial ryegrass would have to be tested. Much of the benefit discussed in

² Thomas Eichelbaum *et al.*, *Report of the Royal Commission on Genetic Modification: Report and Recommendations* (Wellington: Royal Commission on Genetic Modification, 2001), 342, 345 and 360. The HSNO Act, section 68 had economic, environmental, international and health effects as the criteria for ministerial call-in powers. See New Zealand Government, “Hazardous Substances and New Organisms,” (Wellington: New Zealand Government, 1996), 45. For a good outline of biotechnology regulation and issues in New Zealand see Coyle *et al.*, “Public Understandings of Biotechnology,” 3-9.

³ New Zealand Government, “New Organisms and Other Matters Bill,” (Wellington: New Zealand Government, 2003), 9 and 28. This amends section 68 of the HSNO Act. Italics highlight the new criteria of cultural, ethical and spiritual.

the paper implies uncontrolled release of modified organisms, whereas previous and current GM research is highly controlled. Additionally, as mentioned previously, replacing one species with another modified species may also produce new environmental stresses that cannot be predicted, so we may simply be replacing one problem with another.

5. **Epigenetic effects are as yet unknown.** The discussion document notes that ‘the ability to edit genes is, in many cases, ahead of our understanding of everything that genes do’. The example given of gene edited fungi also raises significant issues of unknown epigenetic effects to the physiology of the modified organism and also to the interplay of genes and environment in contexts outside of the laboratory/test environment, both of which may produce unforeseen negative outcomes to the fungi and beyond. Likewise, scenario 5 proposes the deletion of beta-lactoglobulin in milk as being beneficial to the dairy industry, without considering any risk to bovine physiology in the discussion paper. While it would be almost impossible to fully determine changes in whole organism physiology and wider ecological relationships by gene editing a given species, this is a necessary part of the decision-making to use gene editing in any given situation and in deciding on guideline policies.
6. **Economics is only one aspect that must be investigated.** A significant thread within the proposed scenarios, including scenario 3 for the hastening of new apple genetics, is that gene editing offers an economic, quick-fix approach in terms of time and other costly resources. This emphasis on economic benefit focuses solely on short-term economic considerations - a “MacDonaldisation” of technology to solve the problems of the here-and-now, with less emphasis on all potential risks. From the ICBC’s perspective, any attempt to claim that technology can solve all our problems is short-sighted, and we need to apply the precautionary principle, which recognises the risk of hasty action leading to unintended consequences. The statement in scenario 3 regarding customer ‘choice’ of apples from gene edited stock ‘For consumers to have the freedom to make such a choice, labelling (either voluntary or compulsory) will be important’ is misleadingly positive about giving consumers choice. We know that regulations at present in this area are not sufficient and are often confusing for consumers, and ‘voluntary’ means little will be done, with even less informed choice available for customers.
7. **Genuine and active engagement in discussions on taonga species is needed widely with Maori collectives and all other sectors of New Zealanders.** Gene editing of an indigenous species can have unintended impacts and consequences on the whole environment. The use of gene editing technology for taonga species used in primary industries, as proposed in scenario 4, raises significant concerns as we believe all New Zealanders are tasked with caring for our taonga and environments. Therefore, all risks to the taonga species and those in its ecological environment need to be genuinely considered, and by all New Zealanders, including all sectors of Māori collectives. Communication with the general public needs to fully inform people of

all aspects and sides to this debate and be framed as a neutral starter for community discussion at all levels.

As research continues to add to our knowledge of components, capacity and relationships of organisms, we potentially risk missing natural benefits if human manipulation of genetic material actually reduces options for the future. In using gene editing technology, are we altering our taonga species forever, including reducing the natural process of the species developing disease resistance? Modification of taonga species might lead to establishing intellectual property rights of a species, particularly if the species is modified sufficiently to be called in legal terms 'a novel invention'. Any applications of such technology should be accompanied by rigorous conservation of unaltered taonga organism stock. Additionally, before there is uncontrolled release of any genetically modified species, it is important that potential effects on existing endemic species have been tested in case there is a risk of cross fertilisation or transfer.

8. **Health benefit to everyone?** As previously mentioned, health benefit is one area where New Zealanders have felt previously more accepting of genetic modification. In scenario 5, the possibility of gene editing cows to produce milk lacking beta-lactoglobulin, therefore reducing allergic response in some people, is proposed. It is important here to consider the distributive justice for these milk products, since generally modified products are more expensive and would therefore be available only to a small group of people who could afford them, therefore negating the proposed wider benefit for all. Likewise, in each of the other proposed environmental and agricultural applications, the question of 'who benefits?' is relevant and must be seen in the wider and global contexts. A modification in one region or country may be most unwelcome, non-beneficial or inaccessible elsewhere.

In summary, CRISPR gene editing is a powerful tool that is now available, is fast and irreversible, and therefore great care and time is needed to give the kaitiaki expected from all of today's citizens of Aotearoa New Zealand. Such kaitiaki requires rigorous evaluation of the risks and benefits in each situation that includes all voices from viewpoints that are cultural, social, spiritual, and ethical, as well as economic. Currently New Zealand forests, domestic and export food production, and livestock are free of genetic modification, and our laws reflect the seriousness we have taken this stance. Do New Zealanders want this changed? The ICBC looks forward to continuing being part of these inclusive discussions.

Yours Sincerely,

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