



Sense, Science and Sustainability

Can genome editing and agroecology exist within
the sustainable food and farming mix?

Webinar
22 July 2020
10.30am – 12 noon
LIVE Q&A (IN ORDER OF ASKING)

1. Is the webinar starting at 10.30am GST or BST?
2. Can you send a recording please as I have another meeting at 11am. Thanks
3. Why no chat?
4. What do you think of CSIRO's attempts to create fluorescent male eggs so they can destroy them?
5. So when can we contribute to chat- will you let us know?
6. For Phillip. Wouldn't female-only GM eggs allow breeding for egg production methods to become even more extreme?
7. Gene editing impacts areas that normally repair from mutagenesis, what are the issues there?
8. How precise is genome editing? How predictable are the repair mechanisms of the DNA?

9. Since genetically edited/modified plants and animals are consumed by humans, why don't we have clinical trials for these products before they are introduced to the public? How do we know the possible long-term effects of consuming GM products?
10. All gene editing techniques can result in unintended off-target effects and accidental transgene insertion. It is highly misleading to say that it only creates small genetic changes.
11. I believe the problem many people have with GMO's is the potential for cross-pollination with non-transgenics and the resulting seeds being "uncontrolled" in the environment. Would this still occur with gene-editing or would the effects be similar to traditional breeding methods?
12. Wendy Harwood - isn't talking about Roundup (Glyphosate) Ready editing - why?
13. When we have more food than we can eat, around half the bread produced goes in the bin, and we have seen margins for farm businesses reduced, most farms would be unprofitable without subsidies, and profits for retailers increased how can gene editing address the profitability of farms, the waste of food throughout the supply networks and the health issues we have with obesity and other NCDs?
14. Is GM crucial for food security in parts of the world where climate & soils aren't favourable to producing enough nutritional diversity for humans, e.g. in some parts of Africa?
15. Will participants receive a link to download the recording of the meeting?
16. Why are we focusing on the 'technology' and not what traits / qualities we want in our farmed animals and crops? Once we agree on the latter, surely, so long as the end product is safe, the most appropriate technology should be used to achieve it.
17. How is farming to be managed? Small scale local farmers or big scale companies who control everything?
18. I'm interested to hear Wendy Harwood claim precision for gene editing in spite of the now vast number of studies showing unexpected outcomes, including of the type that could lead to the production of novel toxins and allergens in food plants. A few studies are here: <https://gmwatch.org/en/news/latest-news/19223> How does she reconcile these findings with claims of precision and safety?
19. Why is it necessary to conduct genome-editing when research can be done in traditional seeds? India has over 100,000 traditional varieties of rice including drought-resistant, flood-resistant, salt-water resistant varieties.

20. I'm interested in the idea that gene-edited animals might improve animal welfare on farms, for example, to make disease-resistant pigs or hornless cattle. However, I understand that the only feasible approach to generating gene-edited animals involves cloning. Cloning in animals is opposed by many people because of its well known tendency to produce deformed, and non-viable animals. There is evidence to suggest that even the viable cloned animals display signs of ill health, such as premature ageing. So I'd like to ask the panel how they believe the dangers of cloning can be reconciled with the aim to improve animal welfare, in the gene editing of livestock animals.
21. Who controls the IP of gene manipulated material?
22. Claimed: GE protects biodiversity. How? (less pesticide use?)
23. Can Marker Assisted Breeding usefully contribute to plant breeding?
24. You can already get non-GM blight resistant potatoes: <https://www.gmwatch.org/en/news/latest-news/18291-non-gm-blight-resistant-potato-performs-as-well-as-gm>
25. Question to Ms.Harwood: you said, Genome Editing "has been used" to induce traits as drought tolerance - but as far as I know there are no such products on the market yet or near the market, except for the non-browning mushrooms, one herbicide-tolerant rape seed and one variety of soy with changed oil-patterns. Do you have newer information on products on the market, or on the edge of being introduced to the market?
26. To link this point on monoculture with gene editing techniques. If I'm not wrong these techniques only produce clones. As such, whatever the benefit of a given mutation, these crops have very low genetic diversity. It makes them very vulnerable to new disease or weather extremes, and very suitable to monoculture. Isn't this low genetic diversity incompatible with a sustainable food system at +3C?
27. There is enough evidence to show these new gene editing techniques need to be regulated due to unintended effects. Australia has recently changed the definition of gene editing from GM to non-GM. This means that on commercial release, all our grain is at risk as it will be illegal for most of our markets to import any grains at possible risk of having any unapproved GM crop seeds as their legislation has conflicting definitions. As it is too difficult and too expensive to segregate to the zero tolerance required, its not manageable as we could lose all our markets once commercially released. Who should be liable for the economic loss? Scientists? Patent owners? Government? Farmers are currently liable and we do not accept that loss.
28. To Dr. Hardwood: plant traits are very complex, many genes involved in responses to pathogens and pests, do you really believe that "very small changes in some DNA letters" will help to avoid pathogens? How about the epigenetic component of responses (to abiotic stresses and to adaptation to environment)?

29. I think the problem is not the technology but the funding, if there's public funding put into the research in places like JIC, etc, then farmers won't have to be paying for patents, the seeds would be publically available. Imagine not having to rely on fungicides and insecticides if plants are resistant to fungi etc
30. The majority of gene editing patents in crops are owned by the big GM crop companies - Bayer, Corteva etc:
<https://www.testbiotech.org/en/news/patent-cartel-large-companies>
31. Non-browning and omega 3 crops, underwhelming. Why do just 4 crops - soy, corn, canola and cotton - with just 2 traits - herbicide tolerance and Bt toxin - still comprise 99% of broadacre GM crops?
32. Nitrogen fixation in grains; drought, salt and frost tolerant; crops have been promised for 30 years but GM has not delivered. Why are we offered the same false promises using gene editing without evidence?
33. For Jack. Do you see any way that private investment will be attracted towards developing GM tech that reduces food waste?
34. Superseded genetic manipulation techniques could only be to modify single gene traits. Does gene editing promise to mediate mutagenic traits? Which?
35. For Jack, could provide a practical example of how can a crop could be genetically adapted in sustainable way?
36. Is there a role for using all the tools available? Including agroecology, reducing food waste, genome edited/gm plants etc, to reduce carbon emissions associated with agriculture, increase biodiversity and nutritional value. Using all the tools to contribute to a more sustainable and nutritious food system? A system approach.
37. How to direct capital towards local food systems? Gene editing might be less effective than reducing food waste, empowering small food network, or helping farmers transitioning to the high knowledge/high labour techniques of agroecology, but it seems much easier to make a business case for it and attract investors, if only because of the concentration of the market...
38. What role do you think organisations like the Science Media Centre have had when it comes to the breathless hype in the media about gene editing?
39. Australia (pop. 25 mill) has 1.5 million food insecure people and the USA (pop. 350 mill) has at least 50 million people on SNAP (food stamps). High input, intensive, industrial ag, fails to feed people. Prioritise waste, biofuels, and animal feed, or feeding people?

40. How to define a line between gene editing for designer crops and designing human food habits as per the sets genes given to human race by nature?
41. Wendy said "science is continuously moving forward", which means gene editing is not yet the perfect answer. That is, gene editing is NOT yet without faults and should therefore not be released into the environment for fear of uncontrollable contamination by drift, wind, water, mechanical, ...Please comment
42. While I agree with the premise that we should broaden those involved in the decision-making process and disrupt the existing power structure, how does a governing body or citizen choose who is involved in these decisions? There is an enormous range of food literacy. Do we risk selectively choosing 'representatives' that align with our viewpoints?
43. How can we stop CroLife and its corporate members appropriating and greenwashing Regenerative Agriculture?
44. A comment on the science: Recent scientific research has shown that gene editing is not as precise as claimed. Both undesired on-target and off-target effects have been detected (see Testbiotech report "Overview of genome editing applications using SDN-1 and SDN-2 in regard to EU regulatory issues" 2020). In addition, 1st generation genetic engineering is commonly used to insert the gene scissors into the cells, which leads to additional undesired outcomes. Regulation and assessment of risks is therefore necessary from a scientific point of view.
45. If there was more public money to allow private companies to undertake GM research, where a condition is that the private company cannot patent the GM-solution but will be fairly paid for their time and resources, could that work?
46. Could I ask Wendy about this study, which seems significant? <https://www.nature.com/articles/d41586-020-01906-4>
47. Question for Jack Heinemann. I like your point about framing. Can you say a bit more about the feed the world narrative which underpins this discourse? There seems to be an emerging consensus about the three food system goals of nutrition equity, nature restoration and climate change mitigation: do you see gene editing as having a potential contribution to any of those goals?
48. What is the difference between Genome Editing and Genetic Engineering? What new and agroecologically relevant insights and methods of understanding organisms and their interaction does Gene Editing provide?
49. Wendy, as a researcher in gene-editing, how much control do you have on your technology being controlled, misused, and made exclusive to those who can pay for it versus those who really need it.

50. From where the confidence comes to say that genome editing is neutral technology? Such technology comes with its own environmental and social backlog.
51. I think Guy is speaking to the heart of the issue here
52. Aren't current levels of obesity amongst developed nations just another form of food waste - and an even more damaging one than any of the conventional ones
53. Guy, yes, the large companies will dominate. Unless we make the regulation, and hence the cost of placing on the market, proportionate. Then public institutions and smaller companies can participate!
54. "Group think"? Why was the assumption made that TO ALL INTENTS AND PURPOSES the outcomes are the same, it IS the technology that needs to be tested each time.
55. Wendy said in regulation we have to focus on what change is made. But surely, given the studies showing unintended effects from gene editing, we also have to look at the unintended changes and their effects, which are brought about by the processes used to generate the organism. Does she agree that we need to look at these and if so, does she agree that we need process-triggered regulation, which looks at the method by which you obtain the organism as well as the intended product?
56. What do Jack and Philip think about how gene editing could help reduce food waste? For example vegetables that last longer so less likely to get thrown in the bin. Or reduce crop losses in the field through disease resistance without agrochemicals? Once the patents expire a few decades later they could freely accessible despite the initial capitalist issues
57. You guys will do it maybe the right way, the ethical way, the moral way..... but there are hackers, antisocial elements, rogue dictatorships out there that will do this for whatever reasons, bio terrorism etc. that's the worry. How do you enforce?
58. Why can't I see anyone else's questions?
59. "It's not the technology, it's how it's applied" is an important point but genetic engineering as applied to date is fundamentally linked with monoculture. Under what circumstances can panel members envisage a genome edited crop being grown in a genetically diverse cropping system?
60. Is the concept of reprogramming living organisms and the concept of improving our adaptation to their ecological interaction a contradiction in itself?

61. Could researchers like Christine come together with the sustainable food movement to demand that the government develops a sustainable agriculture innovation strategy? The aim of this would need to be to identify the problems in the food system and what is the best way to address them using systems thinking - and THEN what needs to happen in terms of R&D etc. This could result in some much needed changes in narrative and more focus on farmer led innovation and agroecology.
62. A long time ago when GMOs were new in the UK there was huge public debate aimed at informing the public and gathering views. Why is that not happening with gene editing?
63. For Lawrence - I am confused - I thought that the GM camelina was designed to reduce the need to farm/fish salmon - getting the Omega-3's from the plant not from the fishes. You seemed to imply that the camelina was going to feed the fish? Could anyone confirm?
64. The UN Committee on World Food Security's High Level Panel of Experts released their report: Agroecological and Other Innovations for Food Security and Nutrition in 2019. That report clearly showed that agroecological APPROACHES have the potential to support transitions toward more ecological and equitable food systems. Perhaps genome editing as a technology could be used in an agroecological approach - that is an open question - but how can we ignore the realities of corporate concentration and the unquestioned "logic" of economic growth that underpins the use of these new genetic technologies...
65. Are you able to read my question?
66. Is the panel aware that there are base patents on CRISPR technology that mean it will never be 'democratic' or open once a product is commercialised? Research rights are relatively cheap to buy but commercialisation rights are another matter (v expensive) and will always remain in the hands of big boys, whether companies or governments.
67. What do you think of the Norwegian system of GMO regulation which requires a social benefit test?
68. Thanks, I just could not see anyone else's questions.
69. Will this labelling be included on pre-cooked food?
70. Since the ethical and societal concerns about deploying GE on plants are very different from the issues that arise from editing animal genomes, should these conversations remain separate to avoid conflating very different, but very valid concerns?

71. Sorry to ask again, but I'm really keen to know how we can come together to make a recommendation, such as to the government on some kind of sustainable agricultural innovation strategy that DOES ask what the systemic problems of the food system are and THEN asks what needs to happen in terms of R&D. It should change the gov narrative to focussing far more on agroecology. Without something like this, we just go in circles?
72. To provide a platform for choice and for people to enquire/find out more about how food is produced, labelling is crucial. It seems that the UK government will be diluting even the current inadequate labelling compliance required. Basically withholding the information needed for consumers to make an informed choice and 'buy in' to 'sustainability' and higher welfare....