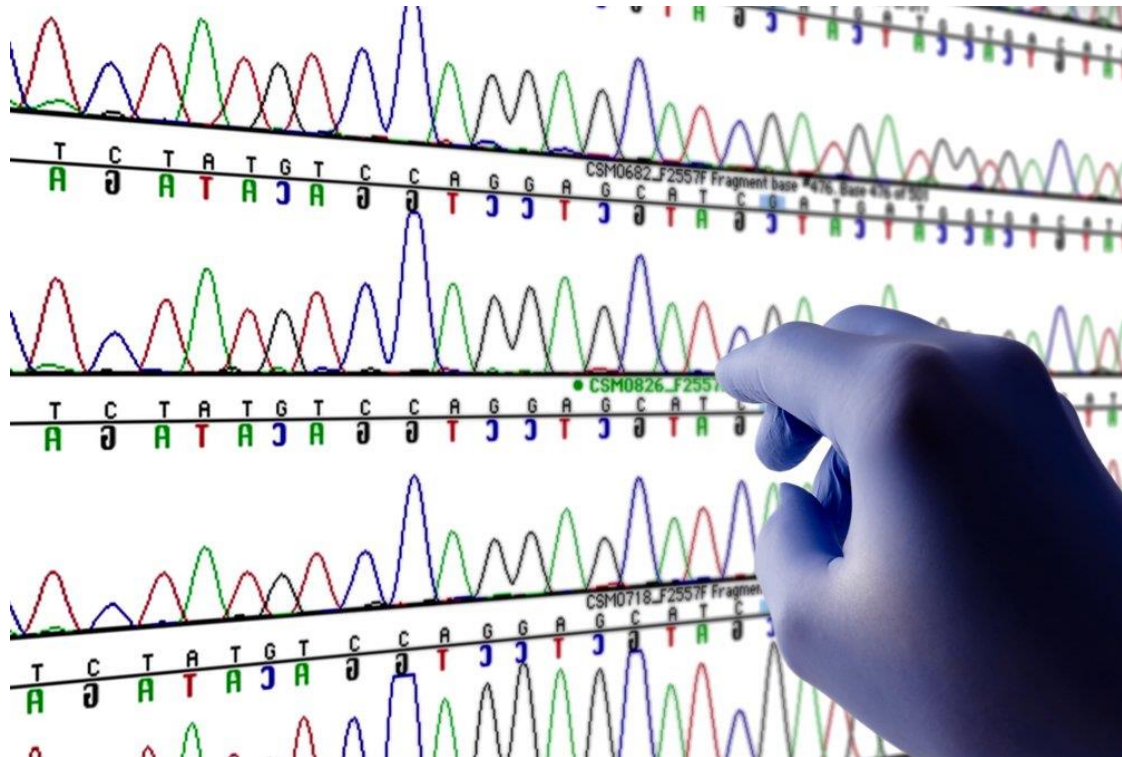


## How will gene-editing reach the farm?

Biotech advocates say regulatory clarity is critical, but not available in Canada

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By Matt McIntosh



*Canadian researchers could be at a disadvantage if gene edited crops and livestock are more quickly approved in other countries. Photo: Bill Oxford/iStock/Getty Images*

Biotechnology experts and supporters from the agriculture and medical sectors met in Toronto recently to discuss how Canada's regulatory system could better enable the safe commercialization of gene-edited plants and animals.

Hosted by Ontario Agri-Food Technologies and CropLife Canada, the March 7 meeting provided an overview of gene-editing regulations in various countries around the world.

This provided context for the range of forms Canadian regulations could take, and the opportunities and pitfalls associated with them.

**Why it matters:** Canada's thorough but inefficient regulatory system could limit farmer access to potentially useful gene-edited crops and animals.

Presenters and attendees voiced concern over the ambiguity of Canada's current regulations on gene-editing.

### **Gene editing around the globe**

Gene editing refers to genetic engineering technologies that add, remove, or somehow alter DNA within a plant or animal for a desired outcome such as disease resistance or a better nutrient profile.

This editing technology differs from other forms of genetic manipulation because it doesn't involve the introduction of genetic material from foreign organisms, as is the case with GM crops like Bt corn. Instead, the DNA being altered exists within the specimen itself. Gene editing is also comparatively precise and quick to execute.

According to Stuart Smyth, genomics expert and associate professor with the University of Saskatchewan's Department of Agricultural and Resource Economics, countries like Argentina, Brazil, and the United States consider gene-edited plants to be separate from GMOs, as long as no foreign DNA is present. Thus, they do not require the same level of regulation, nor incur the same high regulatory costs.

By contrast, the European Union considers all genetic modification processes, including gene-editing, to be GMOs. Smyth says this has led to a significant and rapid drop in agriculture innovation investments in the EU, from a one-third share of global investments to just nine per cent at the end of 2018.

### **Canadian ambiguity creates unpredictability**

Smyth detailed how Canada has yet to conclusively decide where regulations will land. Such ambiguity, he says, causes problems for plant breeders because it makes the process length and cost unpredictable.

SU Canola, a variety tolerant to the sulfonyleurea herbicide, was successfully developed and commercialized in Canada in 2018. Despite its herbicide tolerance, neither government nor industry pushed back against its non-GMO marketing, seemingly indicating the government has taken a view where gene-editing and GMOs are in fact viewed separately, although no formal documentation proving so exists.

At the same time, Smyth detailed a case where canola researchers could achieve a 20 per cent yield bump immediately with a gene-edited variety, but because it would be treated as a "plant with novel traits" (PNT), they opted to introduce that bump at five per cent per year over four years specifically to avoid GMO-related regulatory costs that would otherwise apply.

In a recent survey of Canadian plant breeders, Smyth says 42 per cent of respondents have had at least one research proposal turned down because of uncertainty about the regulatory costs associated with developing a plant with novel traits. One-third also indicated experiencing notable delays in commercializing a PNT in Canada, compared to other political jurisdictions. Eighty-eight per cent of respondents believe the country's PNT regulations need to be updated to reflect advances in scientific knowledge.

"Virtually all of our key competitive countries have moved in a direction that gives them a distinct advantage (in plant innovation)," says Smyth. "I think it's very important that Canada step-up very quickly."

The sheer cost of commercializing a PNT is an even more significant issue for less widely grown horticultural crops, says Michael Pautler, head of genomic services at Platform Genetics Inc., a sub-company of the Vineland Research and Innovation Centre.

Because of the investment exodus occurring in Europe, Pautler says European Union companies looking for new horticultural crops have been increasingly working with Vineland. Lucrative as this has been for the research institution, however, new varieties are developed through mutagenesis, a process that uses radiation to produce potentially beneficial genetic mutations. It is not considered a GMO-regulated technology.

Gene-editing is only used to identify what specific changes the researchers should look for, says Pautler.

Even if gene-editing could be the sole method used to support their European clients, Canadian regulatory costs amounting to tens of millions of dollars don't make sense for crops with comparatively small grower markets.

"You can't spend \$150 million to bring a transgenic petunia to market in a crop worth \$150 million a year globally," Pautler says.

### **Livestock situation more complex yet**

Complex as the plant world is, gene-edited animals bring things to another level – both in terms of challenges and problem-solving potential.

Michael Lohuis, vice-president of research and innovation for Semex, says the greater proliferation and diversity of polled (hornless) cattle, just as one example, offer direct financial savings and safety implications for farmers – as well as improved animal welfare by removing the need for a medical procedure. Developing polled cattle with gene-editing technology is a faster and potentially cheaper commercialization route for breeders, he says, and one that would eliminate substantial inbreeding concerns given current polled dairy cattle lines comprise a mere fraction of Canada's cattle herd.

But like the development of gene-edited plants, uncertain regulatory timelines and costs are significant barriers. Other concerns include animal containment issues during technology development, potential supply chain segregation, labeling, contradictory public perceptions on the technology, and a vast array of further regulatory and supply chain challenges.

"Small to medium-sized companies, we're really in a tight spot," says Lohuis.

"We want to be able to control our food supply domestically [and] be able to compete on an export level with more efficiently produced products."

<https://farmtario.com/news/how-will-gene-editing-reach-the-farm/>