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GM crop ban: how Scottish salmon – and public health – could have benefited from this technology

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World's omega-3 shortage affects farmed salmon. HLPhoto

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The plan to ban the growing of genetically modified crops is disappointing to many scientists. It would be highly unsatisfactory if, as it appears, such an important decision has been made by the Scottish government without a proper informed debate that takes the scientific evidence fully into consideration. It is not enough for the rural affairs secretary, Richard Lochhead, to say that he is not prepared to “gamble” with the future of Scotland’s £14bn food and drink sector.

What we are talking about is simply biological technology with potentially wide and varied applications. Our work at the University of Stirling’s Institute of Aquaculture is a case in point. We have been testing and assessing oils from genetically modified (GM) oilseed crops developed to provide sustainable sources of long-chain omega-3 fatty acids. These nutrients are recommended as part of a healthy diet because they can protect against cardiovascular diseases and promote heart health.

Marine microalgae make most of the world's omega-3, allowing it to work its way up the marine food chain as they are consumed. As a result, it can only be obtained in any significant amount from fish and seafood. This is why oily fish such as Atlantic salmon are among the best sources of the nutrient.

When it comes to farmed fish, the omega-3 has to be included in their diets, both for the good of their own health and to ensure that they have the high levels required to pass on to the consumer. This means that the feeds must mimic their wild cousins' natural diet – hence the historic use of fishmeal and fish oil in “traditional” feeds. These tend to be imported at present, particularly from the west coast of south America, from Peru and Chile.

Unfortunately **there is insufficient** omega-3 of the type required available in the world to satisfy human dietary requirements. As fishmeal and especially fish oil supplies are finite and limited, they are being spread thinner in feeds, and the levels of omega-3 in farmed fish are **declining**. Without new sources of omega-3, the absolute levels of the nutrient will fall below those of wild fish.

Omega-3 being developed

The oils that we are developing from GM oilseed crops – in collaboration with crop scientists led by Professor Johnathan Napier at **Rothamsted Research** – offer a new and sustainable source of omega-3 that can be used to replace the wild fish oil. Having proven the concept, we are now seeking funding for commercial-scale trials. With a fair wind, the work will foreseeably be ready for full-scale commercialisation in the next two or three years.

The project addresses not only an important aspect of population health but also issues of environmental impact, sustainability and food security. When you consider that Scotland has a **high death rate** from heart disease – one third of all deaths – it is ironic that that we are also a nation producing many thousands of tonnes of farmed salmon that can be a rich source of the beneficial omega-3 fatty acids.

Yet the Scottish government would not permit these GM crops to be grown in the very country where the oils the crops produce can be applied most effectively. Assuming our work reaches the market, this would mean that Scotland would lose the financial benefits from growing the oilseed. Neither is it environmentally sound to grow crops elsewhere and ship the oils around the world when they could be grown locally.

These extra costs could undermine the sustainability of the aquaculture industry in Scotland, one of the key segments of the country's food and drink sector. This is of direct relevance to the health and welfare of its people, not to mention consumers of Scottish farmed salmon all over the world.

Obviously this is not to suggest that omega-3 or GM are panaceas for all our ills. Our research simply highlights one application of GM technology to solve a critical problem, and the context within which it was developed. But while few would disagree that Scotland has a beautiful natural environment or that seeking to protect it is a good policy, what exactly are the risks that growing GM crops actually pose? The Scottish government's announcement is rather unclear when it comes to this question.

In **September 2014**, Scotland showed the world how to have a truly public and inclusive debate on a subject of massive national and international importance, make a decision based on that debate, and

then accept and live with that decision. If the true lesson of that was not to have a debate that you think you might lose, the Scottish government appears to have learned it all too well.

📌 Aquaculture Scotland Scottish Government GM foods
Salmon farming GM crops

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Miriam Frankel

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Man with the ban: Richard Lochhead (left) Scottish government, CC BY-SA