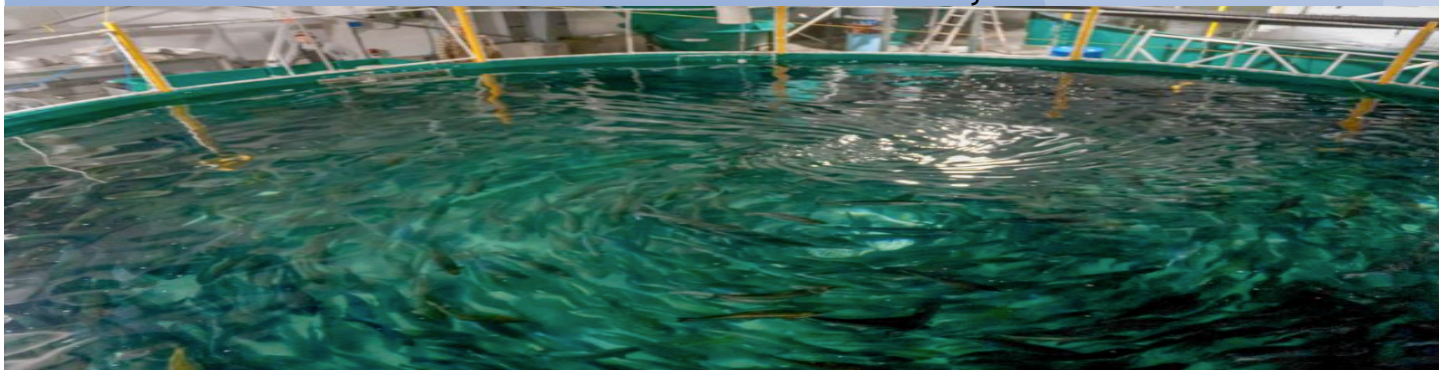


Yes or No to GMO : Should Canada be involved ?

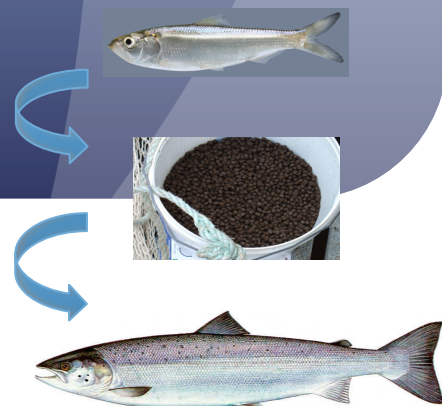
Bio 420: Ocean Conservation and Sustainability

Policy Brief

By: Brock Staller



Executive Summary: Recently, AquaBounty, a US biotech firm, has been granted permission by the FDA to produce a genetically engineered (GE) Atlantic salmon safe for human consumption. AquaBounty produces genetically modified fertile salmon eggs in Canada, which will be shipped to Panama for production. I am writing this briefing to the Canadian Minister of Agriculture to advocate for the removal of the partnership with AquaBounty before they start producing GE salmon for the public.



Why is the topic important?

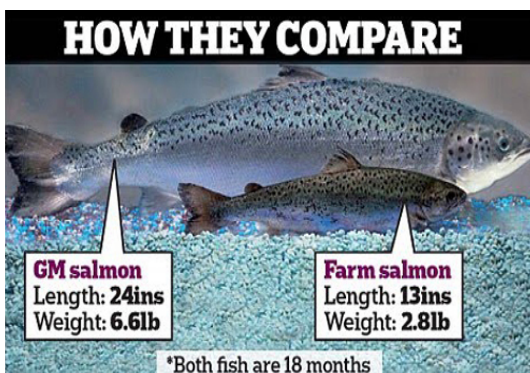
The Aquaculture industry is looking for ways to increase output in a way that is economical and environmentally responsible. This year, the Food and Drug administration (FDA) deemed a genetically engineered (GE) salmon safe for human consumption [1]. However, Health Canada has not approved. The GE Atlantic Salmon grows significantly faster with 25% less fishmeal, reducing the pressure on capture fisheries [1]

Will GE salmon provide for a growing population?

Salmon require carnivorous fish such as herring and anchoveta, reduced to fishmeal, to grow [2]. The use of fishmeal is not efficient, as farmed salmon require 4 kg of fishmeal to produce 1kg of flesh [2]. Salmon farming demand is impacting economies and jobs of developing countries such as Peru, where regulations only allow artisanal fishers to keep whole anchoveta [3]. Even though GE salmon require less fishmeal, they still put pressure on capture fisheries at lower trophic levels and do not solve the problem of feeding a growing population.

What are the risks?

1. Sterility of GE salmon is only 95 %, therefore if any of GE salmon make it into the wild, they could outcompete or breed with native populations [4]
2. The FDA is currently only allowing the salmon to be farmed on-land based facilities in Panama, but compliance and use in open water facilities could increase with commercialization.
3. The GE salmon can only be sold in the US and grocery stores such as Costco, Wholefoods and Safeway have said NO to AquaBounty [5]



Analysis	Current Atlantic Farmed Salmon	AquaAdvantage Farmed Salmon
Strengths	1. A consumer market already exists that people and grocery stores support	1.100 less days to reach maturity [5] 2.Would only be produced on-land based facilities, where water is circulated and antibiotics are not utilized [5]
Weaknesses	1.Can be reared in facilities on land, but also open-water net pens where salmon can escape and breed with native population to lower fitness [6]. 2.Interaction with other species in open-water nets can spread disease and sea-lice [6].	1. Health Canada has not declared the GE safe for consumption and it cannot be sold in Canada [1] 2.If US grocery stores do carry the GE salmon, they DO NOT have to label it [1]
Opportunities	1.Limited for growth	1.Potentially cheaper cost to consumers. 2.More biotech jobs in Canada
Threats	1.If AquaAdvantage culture farms were set up in Canada, it would displace increase current competition with farmers in the industry. 2.Climate change may affect water temperature and the rearing of salmon of open-water pens	1.Commercialization and transport of eggs could make it tough to control compliance of only on-shore farms that the FDA has approved. 2.Furthermore, only 95 percent of eggs are guaranteed triploid and infertile, however the other 5 percent could reproduce with native population [4]

Conclusion: Canada’s production of GE eggs for AquaBounty fish farms in Panama creates a significant liability and risk to the environment. Genetically modified salmon farming practices are efficient and occur at a lower fishmeal cost, but consumer and supermarket demand is currently limited in the U.S. By being associated with the GE eggs, there will be negative repercussions for Canada if AquaBounty salmon reach unintended fish farmers or the wild.

Implications:

- Review the negative outcomes associated with being connected to the AquaBounty company
- Withdraw from the partnership with AquaBounty
- Look to improve current fish farming practices by promoting and subsidizing land-based operating systems compared to open-pen systems.

References:

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[2] Pauly, D., Christensen, V., Guenette, S., Pitcher, T., Sumalia, R., Walters, C., Watson, R., Zeller, D. (2002) Towards sustainability in world fisheries. *Nature* 418, 689-695

[3] UBC (2013, Nov. 9) Don’t hold the anchovies: Study shows Peruvian fish worth more as food than as feed. Retrieved from <http://news.ubc.ca/2013/11/13/peruviananchovy/>

[4] Food and Water Europe (2010) GE Salmon will not feed the world. Retrieved from <https://www.foodandwaterwatch.org/sites/default/files/GE%20Salmon%20Will%20Not%20Feed%20the%20World%20Oct%2010.pdf>

[5] Nosowitz, D. (2015, Nov.19) Costco declares it will not sell genetically-modified salmon. Retrieved from <http://modernfarmer.com/2015/11/costco-wont-sell-gmo-salmon>

[6] Department of Fisheries Canada (2013) POTENTIAL EFFECTS SURROUNDING THE IMPORTATION OF EUROPEAN-ORIGIN CULTURED ATLANTIC SALMON TO ATLANTIC SALMON POPULATIONS AND HABITATS IN NEWFOUNDLAND

