



**INTERNATIONAL CENTRE FOR GENETIC ENGINEERING AND BIOTECHNOLOGY**

An international organisation dedicated to advanced research and training in molecular biology and biotechnology,  
with special regard to the needs of the developing world

# Confined release of Atlantic salmon resistant to furunculosis in Peru

ICGEB course:

Strategic Approaches in the Evaluation of the Science  
Underpinning GMO Regulatory Decision-making

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# General considerations

- Salmonids as a source of food and aquaculture product.
- Furunculosis (intracellular bacterial disease, *Aeromonas salmonicida* produce some toxins for salmons, a problem in fresh water and marine life stages of salmon and extremely widespread – treated by antibacterial medicated feed or injections – commercial vaccines and surface disinfection of eggs – significant mortality in wild populations mainly in river waters with higher temperatures)

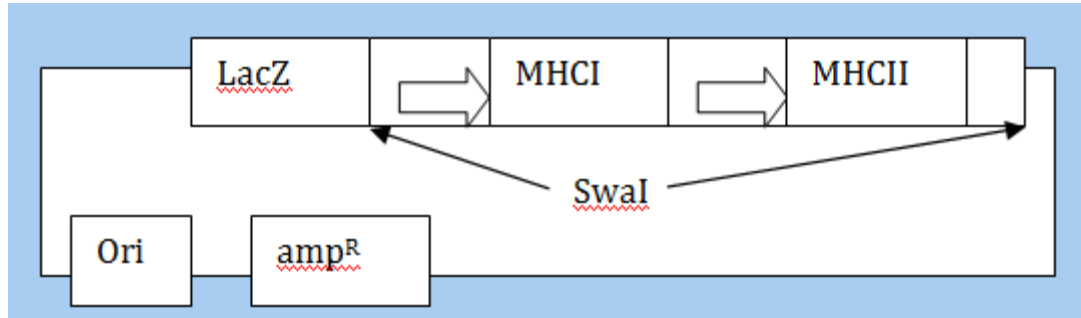


# General considerations

- MHC genes (GMO express two specific alleles- Major Histocompatibility Complex- with high correlation with resistance to infection identified in Canada in Chinook salmon)
- Fishing and aquaculture in Peru (fish industry is a key component of the Peru economy because of anchovy fisheries-fish meal and fish oil industry. Marine resources are amongst the richest of the world. Waters are rich in oxygen and nutrients by Humboldt Current. Domestic consumption and Exports of fish products represents an important participation in the national economy.



# Introduced DNA and trait



- A single, unmodified MHC I allele from furunculosis-resistant Chinook salmon
- Introduced through microinjection
- After breeding, a single insert in non-coding regions, stable over four generations

# r-DNA / GM animal



Compared to non-GM counterpart:

- Higher resistance to Furunculosis
- No significant differences in gross anatomy, histopathology, and almost all clinical chemistry parameters
- No significant differences in behaviour
- No significant differences in almost all key food components

# Proposed Activity

- Triploid hemizygous embryos will be generated in a closed urban facility
- Then, moved by ground transport to grow-out facility
- Grow out facility located by the side of a lake in the highlands of Peru
- Juveniles grown in a tank, then moved to a cage in the lake
- Harvested fish will be used for food production.



# Bio/containment considerations

- Use of physical measures to contain fish
- Choice of geographical location to further contain hypothetical fish escape.
- Reassurance measures: triploidy, awareness campaign
- Accessory issues: land transport, fish wastes, biotic interactions



# Food safety assessment considerations

- Codex guideline:
  - initial animal vs. animal intended for food production.
  - Health status of the animal
- Toxicity analysis proposed to be unnecessary
- Allergenicity assessment: only bioinformatic analysis was performed.
- Nutritional assessment: breeding, vitamin B increase

