

## **(Article 1) Food Safety Fact Sheet: GENETICALLY ENGINEERED FISH**

### **GE Super-Salmon: Coming For Dinner? (What is the AquAdvantage Salmon?)**

The GE “AquAdvantage” salmon now in the final stages of FDA review is engineered with the growth hormone genes from a Chinook salmon (*Oncorhynchus tshawytscha*) and the DNA from the anti-freeze genes of an eelpout (*Zoarces americanus*). This engineering causes the production of the growth hormone year-round, creating a GE fish the company claims grows at twice the normal rate of natural salmon. The intended result is to allow industrial fish farms to increase their productivity: to crowd more salmon into net pens and still get high production rates. In December 2012, FDA announced a public comment period on the FDA’s Environmental Assessment of the GE salmon (Docket No. FDA-2011-N-0899). The specific application seeks approval to manufacture its GE salmon eggs in Canada, ship the eggs to Panama to be grown and then sell the final fish product in the United States for human consumption. However, AquaBounty has stated on numerous occasions that it intends to sell its eggs to aquaculture companies world-wide once it secures FDA’s approval.

### **GE Fish Threaten the Environment and Wild Salmon (What if they escape?)**

- Canadian researchers concluded that if fertile male GE Atlantic salmon were to escape from captivity they could succeed in breeding and passing their genes into the wild.
- Research concluded that a release of just sixty GE fish into a wild population of 60,000 could lead to the extinction of the wild population in less than 40 fish generations. If FDA opens the approval door, GE fish will likely be among the millions of salmon that currently escape every year, resulting in the last blow to wild salmon stocks.
- AquaBounty has claimed that they will only raise their fish in land-based facilities. As a result, FDA dramatically confined its analysis to two small land-based facilities. Regardless, even in land-based facilities, farmed salmon have the ability to escape into the wild, where they will be virtually impossible to recover. At present, the company’s breeding operation is on Prince Edward Island, where the Atlantic Salmon Federation’s surveys have found Atlantic salmon in 22 rivers.
- AquaBounty also says that it will only produce sterile females, but the evidence it submitted to FDA shows that it produces eggs that may be only 95% sterile. Moreover, the company will need to keep stocks of fertile fish to produce additional offspring. If FDA permits companies to raise GE fish in “inland waters” this will present a novel threat to our nation’s lakes, rivers, and estuaries, many of which are already under attack by invasive fish species like the Asian carp and Northern snakehead.
- AquaBounty has stated on record that its goal is to grow the GE fish in the U.S. and elsewhere in the world. While FDA may purport to place initial restrictions on the farming of GE fish, it is likely merely a matter of time before FDA is pressured by corporations to replace conventional fish in open ocean farms with the GE variety, without even adequate analysis of potential impacts.

### **GE Fish Threaten Human Health (What’s the impact of antibiotics given to fish to prevent disease?)**

The human health impacts of eating these GE fish are completely unknown. While data on human health impacts of GE fish is sparse, some recent studies have provided cause for serious concern.

- For example, the routine use of antibiotics to control diseases often found in farm-raised fish may already be impacting human health. Some research has suggested that transgenic fish may be susceptible to more diseases than fish currently grown in aquaculture facilities. Consequently, the

amount of antibiotics given to transgenic fish may be higher than the amount currently given to farmed fish; farmed salmon are already given more antibiotics than any other livestock by weight.

- By eating farmed fish treated with antibiotics, humans will be ingesting antibiotics that may be harmful. Indeed, some antibiotics are toxic and can even cause fatal allergic reactions.
- The use of antibiotics in aquaculture further exacerbates the significant problem of antibiotic resistant bacteria.

## **(Article 2) Nine Things You Need To Know About GMO Salmon**

### **1: What is the AquAdvantage® salmon?**

AquAdvantage salmon is a genetically engineered salmon that grows to market size in half the time as conventional Atlantic salmon. This salmon grows to market weight in about 16 to 18 months vs. 32 to 36 months for conventional salmon.

This salmon contains a growth hormone gene from the fast growing Pacific Chinook salmon and a promoter sequence (a fragment of DNA) from the ocean pout. Combined, the gene and promoter sequence, which acts like an “on” switch, enable the salmon to grow year-round instead of seasonally like wild or farmed salmon.

### **2: Why genetically engineer salmon to grow faster?**

Salmon is one of the most popular fishes available. As of 2014, salmon is the second most consumed seafood in the U.S. Salmon are either caught in the wild through commercial fishing or they are raised via aquaculture (fish farming). Since the 1990's, there has been a decline in wild Atlantic salmon populations.

### **3: What's responsible for the decline in wild salmon?**

90 percent of the world's fisheries are either fully exploited, over-exploited or have collapsed (Ref.). And large fish, like salmon, are the first to go.

In addition to overfishing, pollution, environmental changes, habitat deterioration and disturbances of migration routes have all contributed to the reduction of salmon populations to dangerously low levels. Many salmon populations have disappeared completely. And yet seafood consumption will nearly double by 2050.

This means that farmed fish production will likely need to increase by 133 percent to meet projected fish demand worldwide. GM salmon will provide a sustainable and fast-growing alternative to wild salmon and enhance the production of farmed salmon.

### **4: Is the AquAdvantage® salmon safe?**

Yes. Approximately 20 years of research, testing, evaluations, development and regulations went into getting this salmon's FDA safety approval. In fact, all GM food products must be found as safe as their non-GM counterparts before they come to market. On average, GMOs take 13 years and 130 million dollars of research and development before coming to market.

## **5: Even though it's FDA approved, isn't this fast-growing salmon a "Frankenfish"?**

As the American Council on Science and Health points out, "the term 'Franken' is thrown in front of a lot of biology that anti-science activists distrust and fear because they do not understand." Scary terms and incorrect labels about GMOs are an easy way to create fear and doubts around the safety of GMOs.

But if we remove the label "Franken" and take a deep dive into biotechnology in the context of the term "Franken," you will learn that it's not that scary and that it's only science and innovations. In this post from The American Council on Science and Health, it helps clarify the term "Franken" in the context of GMOs and biotechnology.

## **6: How does this salmon impact the environment?**

This salmon has been developed to actually benefit the environment. For example:

- Conserve wild fish populations. The AquaAdvantage® salmon grows to market-size using 25 percent less feed than any Atlantic salmon on the market today. This means that it requires less wild fish to be converted into salmon feed – which conserves wild fish stocks. Using GE ingredients to replace fishmeal and fish oil requirements in fish feeds are helping aquaculture to be even more sustainable.
- Reduce carbon emissions. Because the AquaBounty salmon is farmed in land-based facilities that are close to cities, it only needs to travel a short distance to the grocery store. This cuts down on transportation and, therefore, carbon emissions, from farm to table. Transporting the AquaBounty salmon emits 23 to 25 times less CO<sub>2</sub> than the two major sources of US Atlantic salmon.
- Provide low impact fish farming. AquaBounty has full control over their aquaculture rearing ecosystem. This means they have total control over water input and discharge, sanitation and the ability to recycle resources. Learn more about the process on AquaBounty's website.

## **7: Will it create new allergies?**

No, this salmon will not create new allergies. In fact, no GMO crop on the market today creates new allergies, and rigorous testing ensures they never will. If a person is allergic to a non-GM plant or animal, for example salmon, he or she will also be allergic to the plant's GMO counterpart.

## **8: How is GMO salmon contained; will it breed with other salmon?**

The FDA requires this salmon to be grown in physically contained land-based facilities, further reducing any potential impact or breeding with wild salmon populations. The tanks that house the salmon have netting and screens to prevent escape. All water pipes going into and out of the facility have multiple physical barriers, such as metal screens, filters and pumps that fish cannot pass through.

As an added precaution, all modified salmon eggs are female and sterile, making it impossible for them to breed among themselves and with other salmon.

## **9: What happens next with AquaBounty's salmon? When can we expect it to be in the stores?**

Although the FDA has approved this salmon for human consumption, it may take a couple of years before it hits store shelves. There are many production planning requirements that need to be worked out before commencing commercial production.