



AquaBounty AquAdvantage Salmon

Background

The U.S. Food and Drug Administration (FDA) is considering approval of AquAdvantage® Atlantic salmon eggs. These eggs include a gene from the Chinook salmon that provides the fish with the potential to grow to market size in half the time of conventional salmon. This fish would be the first food from a transgenic animal application approved by the FDA.

This fact sheet covers the following issues:

- Regulatory Process
- Fish/Egg Facts
- Aquaculture Facts
- Benefits of Land-Based Aquaculture Systems
- Myths & Facts
- Documents and Scientific Bibliography

Regulatory Process

FDA has worked for over a decade to develop a robust system to determine the safety of food and drugs from genetically engineered (GE) animals. FDA guidance was released in January 2009 after international standards were released in June of the previous year by a body overseen by both the United Nation's Food and Agriculture Organization (FAO) and the World Health Organization (WHO). This body is commonly known as the Codex Alimentarius Commission.

The FDA must provide premarket approval and examine the environmental impact of any genetically engineered food animal before it can be made available commercially. Extensive study is required before approval.

The FDA will only approve food from GE animals that are safe to eat. The agency's food safety evaluation looks at the same information recommended by the Codex Alimentarius.

GE animals are regulated under the new animal drug provisions of the Federal Food, Drug, and Cosmetic Act (FFDCA). The elements of this approval process include:

- Product definition;
- Molecular characterization of both the rDNA aspect of the animal and its lineage;

- Comprehensive data on the characteristics of the animal and its health;
- Safety for human consumption;
- Demonstration of effectiveness (label claim); and
- Environmental impact.

Fish/Egg Facts

How are AquAdvantage® Salmon different from other Atlantic salmon?

AquAdvantage® Salmon include a gene from the Chinook salmon, which provides the fish with the potential to grow to market size in half the time of conventional salmon. In all other respects, AquAdvantage® Salmon are identical to other Atlantic salmon.

Are the salmon grown from AquAdvantage® eggs also genetically modified?

Although salmon grown from AquAdvantage® eggs are the same biologically and nutritionally as any other Atlantic salmon, their accelerated growth comes from the addition of a growth hormone gene from the Chinook salmon. The Chinook growth hormone is the same as the Atlantic salmon growth hormone; it is simply regulated differently. Their ability to grow faster does not change the biological make-up of the fish. It is important to note that AquAdvantage® Salmon expresses a salmon protein in a salmon.

How well has this been researched?

The development of AquAdvantage® Salmon is based on more than two decades of scientific research, making it the most studied line of Atlantic salmon.

Aquaculture Facts

Aquaculture, or fish farming, has increasingly stepped in to fill the gap where capture fishing fails to meet consumer demand. Largely dominated by Asia, the aquaculture industry grew dramatically for decades but recently has begun recently to moderate.

- Capture fishery production stopped growing in the mid 1980s. Even as consumer demand continues to rise, fisheries worldwide are on the verge of collapse, largely due to overfishing. Overall, 80 percent of world fish stocks are already fully exploited or overexploited.
- Aquaculture currently provides 47 percent of fish consumed worldwide.
- Over the past 50 years, world aquaculture grew dramatically, from 1 million tons in the early 1950s to 51.7 million tons in 2006 – making it a \$78.8 billion industry.

- Aquaculture has maintained an annual growth rate of 8.7 percent worldwide (excluding China) since 1970.

Benefits of Land-Based Aquaculture Systems

Consumer Benefits

Is there a need for a faster-growing fish?

By 2020, the global demand for animal protein is projected to be 20 million tons per year. AquAdvantage® eggs will help address the need for healthy protein by producing more fish in less time compared to current salmon farming techniques. AquAdvantage® Salmon can be grown in contained facilities, which offer environmental advantages compared to historical cultivation methods.

Don't consumers already have enough salmon?

Salmon is a popular seafood choice, not only for taste, but for the well-documented health benefits. This has increased demand for farmed and wild salmon products that the industry and capture fisheries will not be able to meet.

Are farmed salmon a healthy alternative to wild salmon?

Atlantic salmon is a great source of heart healthy Omega-3 fatty acids. AquAdvantage® eggs are designed for growth in land-based salmon hatcheries that will provide high-quality facility management and control. There is a lower likelihood for the introduction and spread of disease, and a corresponding reduction in the need for disease treatment. In addition, contrary to unsubstantiated claims disseminated by opponents of this technology, genetically modified salmon do not contain toxins.

Environmental Benefits

Can fast-growing salmon help reduce pressures on dwindling wild fisheries?

Many of the world's fisheries are in distress or in danger of collapse. A 2006 study published in Science predicted the loss of all commercially captured species of fish by 2048 if current fishing practices are maintained. Yet overfishing continues as the demand for seafood increases. The vast majority of Atlantic salmon sold in the U.S. is farmed. Many American wild salmon populations are in steep decline, so much so that commercial fishing runs in West Coast have been closed several times. With closures in early 2009, salmon fishermen lost their livelihood for the second season in a row and the price of wild salmon soared as a result of shortened supply. By providing a ready source of faster-growing fish, salmon grown from AquAdvantage® eggs can help reduce pressure on wild fish stocks.

Won't the demand for salmon food offset any protection of wild fish stocks?

Accelerated growth means shorter production cycles and more efficient use of feed. The feed conversion rate for AquAdvantage® Salmon is approximately 10% better than other farmed salmon. Additionally, there are emerging technologies in the salmon feed industry that use more sustainable foodstuffs for salmon feeds, reducing the amount of fishmeal and fish oil used.

Does this fish have any impact on carbon emissions?

Because fresh and frozen fish are flown to markets all over the world, seafood has a large carbon footprint. AquAdvantage® Salmon are designed for on-shore facilities that can be built closer to consumers to reduce the need for energy-intensive shipping and transportation.

Isn't fish farming bad for the environment?

The contained, land-based systems used by customers of AquAdvantage® eggs are endorsed by most environmental groups as a more environmentally friendly and responsible alternative to traditional sea-cage farming of salmon.

Won't the fish escape and breed with native populations?

Fish grown from AquAdvantage® eggs are all female and sterile, making it impossible for them to breed amongst themselves. In addition, FDA approval requires them to be grown in physically contained systems, further reducing any potential impact on wild populations.

Business Benefits

How do aquaculture producers benefit?

Faster growth and greater efficiency mean a more efficient use of capital, reduced feed costs and less time to market. Better economics makes interest in land-based culture feasible, which leads to better biosecurity, reduced disease risk and the opportunity to grow salmon closer to markets.

How do restaurants benefit?

The majority of seafood consumed in the U.S. is in restaurants. The AquAdvantage® Salmon developed by AquaBounty will help increase supply to satisfy growing demand with a dependable, high quality product.

American Economic Growth

Aquaculture provides opportunities for U.S. jobs. Today the U.S. imports over 97% of the Atlantic salmon sold to consumers. The introduction of land-based salmon farms in the U.S. would spur investment into this industry in our country.

Myths and Facts

Environmental and Consumer Concerns

MYTH: Farmed AquaAdvantage® Salmon will escape and breed with wild fish, wreaking havoc on ecosystems.

FACT: AquaBounty products are designed for contained, land-based growing facilities operated under strict FDA requirements. In addition, AquaAdvantage® Salmon are sterile females - thus eliminating possibilities for cross-breeding.

MYTH: This is a GMO FrankenFish.

FACT: Salmon grown from AquaAdvantage® eggs are the same as any other Atlantic salmon. They do not grow to a larger size than conventional Atlantic salmon. Their ability to grow faster does not impact the nutritional or biological make-up of the fish. AquaAdvantage® Salmon simply makes more efficient use of its salmon growth genes.

MYTH: AquaAdvantage® Salmon farming methods produce contaminants.

FACT: AquaAdvantage® eggs are designed for closed rearing systems, which are closely monitored to maintain clean and healthy growing conditions. Claims of contaminants or toxins in AquaAdvantage® Salmon are completely unfounded.

MYTH: This is an untested product and should be met with skepticism.

FACT: Salmon grown from AquaAdvantage® eggs have been studied rigorously for over 20 years - more than any other salmon in existence. The food produced from these salmon are exactly the same, chemically and biologically, as any other Atlantic salmon.

MYTH: Aquaculture can lead to overfishing.

FACT: AquaBounty is committed to reducing pressures on ocean ecosystems. Consumption of farmed fish reduces pressure on wild stocks. The fish-to-feed ratio for our salmon is less than the industry average for cultivated fish.

Industry/Regulatory

MYTH: These fish should be labeled.

FACT: Food labeling is intended to provide information on product composition and safety. Because salmon grown from AquaAdvantage® eggs are nutritionally and biologically the same as any other Atlantic salmon the consumer purchases, there is no reason for it to be labeled as different. Voluntary labeling is sometimes acceptable, but would be the responsibility of the fish growers. AquaBounty is happy to make "good stewardship" labeling guidance available to the aquaculturists that buy our products. We would recommend that they also identify the environmental and sustainability benefits of the product in their label.

MYTH: There needs to be supply chain management.

FACT: Supply chain management and traceability are facts of life in modern food production. The adoption of AquaAdvantage® Salmon is entirely compatible with this practice. In addition, every grower will be inspected and approved by the FDA, providing an even higher level of assurance of product quality.

Documents and Scientific Bibliography

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