Johns Hopkins Center for a Livable Future
Bloomberg School of Public Health
615 North Wolfe Street, W7010
Baltimore, MD 21205

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Division of Dockets Management (HFA–305)
Food and Drug Administration
5630 Fishers Lane
Room 1061
Rockville, MD 20852

The opinions expressed herein are our own and do not necessarily reflect the views of The Johns Hopkins University.

RE: Comment on Draft Environmental Assessment and Preliminary Finding of No Significant Impact Concerning a Genetically Engineered Atlantic Salmon (Docket No. FDA–2011–N–0899)

To Whom It May Concern:

Thank you for the opportunity to comment on the *Draft Environmental Assessment and Preliminary Finding of No Significant Impact Concerning a Genetically Engineered Atlantic Salmon*. The Johns Hopkins Center for a Livable Future (CLF) is an academic research and education center based at the Bloomberg School of Public Health that investigates the interconnections among food systems, public health, and the environment.

As public health scientists, we are concerned that the process being used to approve the first genetically engineered (GE) animal for human consumption is both inappropriate and inadequate. Specifically, the environmental assessment (EA) does not consider all relevant environmental impacts and relies upon flawed, insufficient food safety data. We believe that a separate process should be developed for reviewing GE food animals instead of applying an existing process that was designed to assess new animal drugs. A more appropriate review process would not only evaluate environmental risks comprehensively and require robust food safety data, it would also consider relevant economic, social, and cultural issues, and unequivocally address labeling requirements for GE food animals. Below, we highlight the main problems we have identified regarding using the EA and provide recommendations to rectify these shortcomings.

Issue #1: The consideration of environmental impacts in the Environmental Assessment is too narrow.

The process currently being used to determine approval of AquAdvantage salmon (the trade name for GE salmon) is designed to assess new animal drugs. Animal drugs can affect the food supply and the environment due to residues in treated animals and introduction of the drug or contaminated waste into the environment (Wall and Strong 1987; Chee-Sanford et al., 2009), and a New Animal Drug Application (NADA) is designed to evaluate and respond to these impacts. Using a NADA to consider a GE food animal for human consumption means that either an Environmental Assessment (EA) or an Environmental Impact Statement (EIS) must be prepared to determine the extent of environmental risk associated with the new animal drug or feed additive. An EIS is required when the FDA determines a proposed action may significantly affect the environment; it is comprehensive and considers risks in a holistic manner (FDA 2012). Sometimes an EIS is required after an EA is completed due to findings of a likely significant environmental impact. Unfortunately, an EA, which has a narrower focus and can include significant portions written by the company seeking approval of a product, has been accepted in the case of GE salmon. The EA only considers the specific proposal, which means that in the case of AquAdvantage salmon the hatchery facility in Canada and the grow-out facility in Panama are the focus of the assessment and there is no consideration for how the GE salmon industry may grow and expand in the future. A new EA will be required for future facilities that aim to sell their products in the U.S., but if approval is granted on a case-by-case basis, there will be no comprehensive consideration of the public health and environmental risks of approving GE salmon. While the draft EA is possibly correct in stating that there is a low likelihood of AquAdvantage salmon escaping and establishing in the environment near AquaBounty's Canadian hatchery or Panamanian grow-out facility, AquaBounty's production, sales, and distribution of salmon eggs or fry are expected to expand based on its business model as a hatchery and fish supplier. With additional facilities, the risk of escape, establishment, and perturbation of the physical environment by AquAdvantage salmon would increase significantly, especially if production practices vary. These environmental risks would be more evident if cumulative environmental impacts were assessed using an EIS.

Members of the Veterinary Medicine Advisory Committee (VMAC) of the FDA have noted the same concern. Mr. Gregory Jaffe, Director of the Project on Biotechnology for the Center for Science in the Public Interest and a member of the VMAC, stated the following during a September 20, 2010 public hearing:

> *I worry that there is not a cumulative impacts analysis. And that this is a way to sort of get around doing an environmental impact statement about the fact that this salmon could be grown in multiple locations around the world in multiple facilities with different levels of control on them. So I think there is a concern that these things are going to be very segmented to an EA for this facility, an EA for that facility, and each of them individually may look like a very good containment process. But the fact that you start flying these eggs to multiple places, many,*

> *many different places -- it is much easier to control things when it is two facilities that are very closely watched by AquaBounty.*

Another member of the VMAC, Dr. Gary Thorgaard, Professor of Genetics at the University of Washington, stated during the same hearing,

> *I personally still feel like considering this issue in a comprehensive way, together with other agencies through an environmental impact statement, would be the best way to proceed.*

Use of the NADA process to consider a GE animal for human consumption means that, in accordance with the National Environmental Policy Act (NEPA), the potential impact to the environment *of the United States* is the primary consideration for approval. This is not appropriate since, as is the case in this proposal, simply locating proposed activities in other countries can downgrade the level of scrutiny required for evaluation. For example, if an EA concludes that a significant environmental impact is likely to occur in the U.S., an EIS would be required as part of the review process.

Issue #2: The EA accepts flawed and inadequate food safety data.

Food safety issues are treated as a secondary concern in the NADA approval process, which further highlights the need for a specific review process for GE food animals. Numerous problems exist regarding the evidence used to support claims of food safety in the EA, including sample size, study duration, and general quality of research, thus significantly limiting the characterization of potential toxicities and allergenicity of AquAdvantage salmon. These data limitations would not be tolerated in an approval process sufficiently focused on food safety with rigorous requirements developed by a panel of experts representing a range of backgrounds, including public health.

The evidence being used to demonstrate the safety of GE salmon is supplied by AquaBounty, the company applying for approval of AquAdvantage salmon. The data are unpublished and not publically available, hence the scientific community is incapable of determining whether adequate rigor and appropriate methods were used to generate the original data. The company has an economic incentive to facilitate NADA approval, which could affect their study design, analysis, interpretation, and reporting. In fact, several members of the VMAC criticized the food safety research design in a September 20, 2010 meeting. These experts noted that AquaBounty tested the *difference* between their product and a comparator instead of testing for *equivalence* between their product and a comparator; the latter approach requires a larger sample size and adds an extra measure of safety. These data are accepted as sufficient for demonstrating food safety in the current EA.

Further, FDA itself has identified flaws in the industry-supplied data (in reference to the western blot assay of salmon allergens; FDA 2010 Briefing Packet, p. 104):

> *We have determined that the technical flaws in this study so limit its interpretation that we cannot rely on its results*.

One measure AquaBounty has proposed to reduce the chances of a GE salmon reproducing with a wild salmon if it escaped into a waterway is producing sterile fish by inducing a condition known as triploidy, whereby the fish have three sex chromosomes instead of two (diploid) and are unable to reproduce. During the process of converting diploid salmon into triploid salmon, as many as 1 in 20 salmon (5%) can remain diploids (FDA 2010 Briefing Packet pg 57). FDA reviewed the food safety of triploid and diploid AquAdvantage salmon, and identified uncertainties in assessment of allergenicity from diploid AquAdvantage salmon. FDA states (FDA 2010 Briefing Packet p. 109):

> *Although we have not identified any food consumption hazards for diploid AquAdvantage Salmon, because of the low quality of the study evaluating the allergenicity of salmon tissue, there are uncertainties regarding the allergenicity of edible products from diploid AquAdvantage Salmon.*

The low confidence in diploid AquAdvantage salmon allergenicity must be addressed before the FDA makes a decision on the NADA.

These types of gaps in the review process for the AquAdvantage NADA are deeply troubling and indicate that more food safety studies are needed. We suggest new food safety studies be conducted by neutral, third-party researchers to test for product equivalence. Furthermore, rigorous requirements for data and independent studies should be developed by experts and required for all GE food animal applications in the future.

<u>Issue #3</u>: The focus of the current review process is too narrow.

A finding of no significant environmental impact in the EA excludes consideration of other impacts of the proposed action from consideration. FDA states in the EA, "social, economic and cultural effects of the proposed action on the United States have not been analyzed and evaluated because the analysis in this draft EA preliminarily indicates that the proposed action will not significantly affect the physical environment of the United States" (FDA Draft EA 2012, p 2). Excluding all considerations regarding impacts on current salmon and other seafood producers, consumers' views on the acceptability of consuming a GE animal, and other issues highlights the inappropriate nature of using the NADA process to determine if a GE food animal should be sold in the U.S. This action is especially of concern because the FDA's framework for assessing AquAdvantage salmon will likely set a precedent for approval of other GE food animals in the U.S. and will be viewed as an endorsement for genetically-altered food animals by other countries.

In a September 21, 2010 hearing, the FDA considered whether there were "material" differences, such as nutritional, organoleptic or functional differences, between AquAdvantage salmon and Atlantic farm-raised salmon. These differences are the *only* basis by which the FDA considers labeling GE products. We expect FDA to return a

finding of no "material" difference, meaning AquAdvantage salmon sold in the U.S. will likely not be required to carry GE labeling. As public health scientists, we believe strongly that clearly labeling food that has been genetically altered is critical so that potential human health effects can be evaluated. GE foods have not been labeled in the U.S., which means that if there are human health impacts it is virtually impossible to study and track them. This is especially concerning for sensitive populations, such as children and people with food allergies. This results in interpreting a lack of human health data to mean that there are no health impacts from consuming GE food products, when in fact a lack of data simply means we do not know if there are health effects at the population level.

In addition to public health concerns, a lack of labeling of GE foods severely restricts consumer autonomy and constitutes a breach of ethics. Autonomy is defined as "respect for persons" and within this definition, withholding information demonstrates a lack of respect for the autonomous individual since he/she is no longer able to make a fully informed decision (Belmont 1979). People may consider a variety of morals or ethics when deciding what to eat, which may be outside of the scope of FDA's test of "material" difference. Evidence suggests that consumers are aware of GE foods and may have reservations about consuming them. Many in the U.S. view GE foods as "unnatural" and "risky" (Knight 2009), and it should be an option for consumers to avoid GE foods if they wish.

Recommendation: Development of a new process specifically for consideration of GE food animals is needed, but if the NADA process is used for this purpose an EIS should be automatically required due to the different risks associated with GE animals as compared to new animal drugs.

While a GE animal destined for human consumption may appear to involve some of the same issues as a new animal drug, many of the issues that must be considered are quite different and require a new, distinct approval process outside of the proposed FDA approach. Environmental and public health issues unique to GE food animals include the risk of introducing the genetically altered animal into sensitive ecosystems and food safety concerns that are different from problems associated with drugs administered to food animals. The NADA process is not designed to evaluate the unique food safety and environmental issues associated with a GE food animal, and an EA is inappropriate and inadequate in this precedent-setting case. Approving a GE food animal using an EA has the potential to clear the way for future approvals of GE food animals with non-rigorous requirements for food safety data and environmental assessments that are very limited in scope. We recommend not approving AquAdvantage salmon at this time. The FDA, along with additional experts and other federal agencies, should develop a specific review process for GE food animals that requires food safety studies performed by independent scientists. If GE salmon is approved through a rigorous, comprehensive, and transparent process, public health professionals would be confident that human health risks had been more properly assessed. In addition, labeling of GE food products should be required in

order to facilitate tracking of adverse health impacts and to allow consumers the option to avoid GE foods.

We hope our recommendations will form the basis for additional action, and we would be more than willing to work with the agency to implement them. Please contact us with questions about this comment or the issue of approval of GE animals for human consumption more generally.

Sincerely,

Robert S. Lawrence, MD
Center for a Livable Future Professor
Departments of Environmental Health Sciences, Health Policy and Management, and International Health
Bloomberg School of Public Health
Director
The Johns Hopkins Center for a Livable Future

Keeve E. Nachman, PhD, MHS
Assistant Scientist
Departments of Environmental Health Sciences and Health Policy and Management
Bloomberg School of Public Health
Program Director
The Johns Hopkins Center for a Livable Future

Jillian P. Fry, PhD, MPH
Department of Environmental Health Sciences
Bloomberg School of Public Health
Project Director, Public Health and Sustainable Aquaculture Project
The Johns Hopkins Center for a Livable Future

Dave C. Love, PhD, MSPH
Assistant Scientist
Department of Environmental Health Sciences
Bloomberg School of Public Health
Science Director, Public Health and Sustainable Aquaculture Project
The Johns Hopkins Center for a Livable Future

References:

Belmont Report, 1979. The Belmont Report: Ethical principles and guidelines for the protection of human subjects of research.
hhs.gov/ohrp/humansubjects/guidance/belmont.html

Chee-Sanford JC, Mackie RI, Koike S, Krapac IG, Lin YF, Yannarell AC, et al. 2009.

Fate and transport of antibiotic residues and antibiotic resistance genes following land application of manure waste. J Environ Qual 38(3):1086–1108.

FDA, 2012. Environmental Impact Considerations. http://www.fda.gov/AnimalVeterinary/DevelopmentApprovalProcess/EnvironmentalAssessments/default.htm. Last updated 12/07/2012.

Knight, A.J., 2009. Perceptions, knowledge and ethical concerns with GM foods and the GM process. Public Understanding of Science. 18:188-188.

Wall R, Strong L. 1987. Environmental consequences of treating cattle with the antiparasitic drug ivermectin. Nature 327(6121):418–421.