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FOR ENGINEERING AND SCIENCE

Case - AquAdvantage Salmon

Description

A case study looking at genetically engineered salmon. Part of unit 4 of the Course on Genomics, Ethics and, Society.

Body

Over the last 20 years, the U.S. Federal Department of Agriculture (FDA) has received an increasing number of applications to commercialize genetically modified animals. These animals' unmodified counterparts are already consumed in large quantities. In most cases, the genetic modifications are aimed at increasing growth, improving nutritional quality, or increasing resistance to disease.

In 2012, the FDA responded to these applications for the very first time (Ledford, 2013; Maxmen, 2012). AquaBounty, a company based out of Waltham, Massachusetts, first applied to the FDA for approval of its genetically modified "AquAdvantage" salmon in 1995. Though the FDA declared the salmon safe to eat in 2010, it wasn't until May 2012 that the FDA released a preliminary report concluding that the fish were not a hazard to the environment. However, it has not yet made a final decision. If the salmon are approved (which many experts assume they will be), grocery stores will have the option to purchase the salmon, and consumers will have the option to eat it.

The AquAdvantage salmon was created by inserting a growth-hormone gene from a Chinook salmon into the Atlantic salmon genome. This produces salmon that supposedly looks and tastes exactly like non-engineered Atlantic salmon, but reaches market weight in 18 months, rather than the normal 3 years, and consumes 25% less food than non-engineered Atlantic salmon. The AquAdvantage salmon is

seen by its developers as the first step towards more efficient and environmentally friendly farmed animals. An additional argument is that these farmed fish will reduce pressure on wild fish populations.

Approval has been delayed for GM salmon, as well as other GM foods, because of the potential threat they pose to the environment and, if they are consumed, to human health. AquaBounty has taken a number of steps to address these concerns.

First, with respect to environmental concerns, AquaBounty has developed its salmon on a mountain in Panama, far away from waterways, in tanks with multiple layers of protection. If other fish farmers wish to develop the salmon further, AquaBounty has also promised only to sell to farmers with similar containment facilities. Furthermore, all fish are female, and through the genetic modification process have been made sterile.(AquaBounty 2015)

However, opponents have claimed that these steps are insufficient. It’s still possible that the salmon could escape, either from their tanks or during transportation. They could also be released, either accidentally or deliberately (e.g., through an act of vandalism).

If an escape occurred, it is already known that even ordinary farmed fish can harm natural waterways and impact wild species. For instance, there is evidence that intermixing farmed salmon with wild salmon can have detrimental effects on wild populations if they breed with one another (Fleming et al., 2000; McGinnity et al., 2003). Farmed salmon have undergone artificial selection for specific traits that, when passed onto wild populations, could reduce their competitive advantages. GM salmon would likely have a similar effect, though they could potentially increase the competitive advantages of wild populations (e.g., by needing to eat less to survive). Whatever specific effect GM salmon might have, their release would certainly be detrimental to some species (either salmon or non-salmon).

With respect to human health concerns, AquaBounty has reportedly conducted over 50 studies in order to ensure that their salmon poses no more of a threat than ordinary salmon currently found in grocery stores (Ledford, 2013; Maxmen, 2012). The FDA has approved the validity and legitimacy of these tests, but has not conducted any tests of its own.

Public rejection of GM animals in general has also been a concern for AquaBounty scientists and developers. Regardless of the safety

of AquAdvantage salmon, many people are reluctant to purchase and consume GM food of any sort. Certain grocery chains, for instance, already plan to ban the salmon from their stores (Swaine, 2013).

Some scientists and developers find it worrying that so many resources are being spent on projects that meet with public rejection. For instance, scientists in Ontario, Canada in 1999 created pigs that could digest plant phosphorous, thus reducing the environmental impact of swine production, but were killed in 2012 due to lack of commercial interest (Ledford, 2013). Many GM animals successfully created, with the intention for commercialization, have yet to receive evaluation from the FDA (either approval or disapproval), which many suspect is due to public disapproval.

Imagine that you have been assigned the responsibility to create general ethical guidelines and policies for the creation and development of genetically modified animals, particularly those intended for consumption. What would your main ethical concerns here be? Would you allow (a) research on GM animals for consumption and (b) permit their commercialization for consumption? Why or why not? If you think that research/commercialization should be permitted what steps would you take to ensure that GM animals do not pose a threat to the environment or human health? You should relate your answer to one particular case, either the AquaBounty case or some other case.

References Used:

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