

# Biotech Animals: Science, Benefits, Risk & Public Sentiment

## Objective

In this lesson, students will: (1) Explore enhancements that can be made to animals using biotechnology, (2) consider advantages of producing GM animals, (3) research possible concerns associated with GM animals, and (4) analyze public opinion data about the use of biotech animals.

## Introduction

Explain to students that genetically modified animals (also known as “GM” or “biotech” animals) are developed by taking genetic material from one organism and inserting it into the genetic code of another. Animals have been modified to make them grow faster, produce vaccines, be more ecologically friendly, and help in biomedical research. In the case of GloFish® fluorescent fish, the first commercially available biotech animal, the fluorescence gene from a sea coral was injected into zebrafish eggs. These genes become part of the genetic makeup of the zebrafish, allowing the fluorescent color to be transmitted to all future generations.

Originally, fluorescent zebrafish were produced to help find pollutants in water. The idea was that non-fluorescing fish would indicate the water was safe, whereas a fluorescing fish would indicate danger (i.e., water pollution). To show your students a diagram illustrating the procedure of producing genetically modified GloFish, please see the following web page:

[http://www.glofish.com/Development\\_of\\_Transgenic\\_Fish.jpg](http://www.glofish.com/Development_of_Transgenic_Fish.jpg).

## National Standards Addressed

Science as Inquiry A—Science in personal and social perspectives  
Life Science C—Molecular basis of heredity

## Materials

Aquarium of GloFish®  
Computer with Internet connection  
PowerPoint

Possible websites to use for research:

[http://www.fda.gov/Fdac/features/2001/101\\_fish.html](http://www.fda.gov/Fdac/features/2001/101_fish.html)

<http://www.bio.org/foodag/facts.asp>

<http://www.ext.vt.edu/pubs/biotech/443-003/443-003.html>

[http://www.csrees.usda.gov/nea/biotech/in\\_focus/biotechnology\\_if\\_animal.html](http://www.csrees.usda.gov/nea/biotech/in_focus/biotechnology_if_animal.html)

<http://www.dana-farber.org/abo/news/press/020703.asp>

<http://www.nus.edu.sg/research/rg12.php>

<http://www.aquabounty.com/products.html#aquadvantage>

<http://www.uoguelph.ca/enviropig>

## Time Allotment

Two 55 minute periods

## Procedure

1. Break up the classroom into groups of four or five.
2. Have each group research their information on the internet. You can use the websites in the materials section to help them get started.
3. Include the following information in your presentation:
  - a. Name three other GM animals besides GloFish®.
  - b. Discuss five potential benefits of biotech animals.
  - c. Consider five potential concerns with GM animals and how those concerns are being addressed.
  - d. Review the process for regulating biotech animals.
  - e. Include data on public opinion of GM animals.
4. Have each group create a PowerPoint presentation and present their information to their class.

## Discussion Questions:

1. What types of traits are being modified in animals?
2. How comfortable are you with the genetic modification of animals?
3. In terms of the end result, are there any material differences between changing animals with modern biotechnology compared to changing animals over time through selective breeding? Are changes made through biotechnology more or less precise?
4. What steps are taken to ensure that biotech animals are ecologically safe?
5. Why is the genetic modification of animals controversial?
6. Do you expect that this technology will be commonplace in the future?
7. Are the arguments against GM animals scientific or ideological?
8. What are good strategies for separating fact from fiction in the debate?

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## *Teacher's Guide*

### **Intended Grade Level**

6<sup>th</sup>, 7<sup>th</sup>, and 8<sup>th</sup>

### **Conclusion**

Students will develop a foundation for understanding the scientific background to genetically modified organisms. Students will be able to assess the advantages of biotech animals and develop a viewpoint in support of their scientific evaluation.

### **Outcome/Assessment**

Use the following rubric to grade projects:

1. Did the presentation include at least five advantages to producing GM animals? 20 pts
2. Did the presentation discuss mechanisms for regulating GM animals? 20 pts
3. Did the presentation include at least three biotech animals besides fish? 20 pts
4. Did the students include public opinion data regarding biotech animals? 10 pts
5. Was the presentation neat and easy to read? 10 pts
6. Was the presentation delivered in a clear, understandable manner? 10 pts
7. Was the presentation organized in a clear, understandable manner? 10pts