**Activity: Ethical frameworks and transgenics**

In this activity, students learn about the ethical issues raised by transgenic cow research and explore how ethical frameworks can be used to guide decision-making on an ethical issue.

By the end of this activity, students should be able to:

* understand that transgenic cows may be used to make medicines
* identify some of the ethical issues raised by using transgenic cows to make medicines
* learn about 5 ethical frameworks commonly used to discuss ethical issues
* understand that 1 or more ethical frameworks can be used to guide decision-making on an ethical issue.

**Introduction**

Scientists at AgResearch in New Zealand have successfully modified cows with a human gene to produce therapeutic proteins in their milk. These transgenic cow ‘bioreactors’ are a relatively fast and cheap way of making proteins that can be used to treat human diseases. A transgenic herd of cows could make enough protein to treat many people, and once established, the herd can be maintained by conventional breeding. However, the process of modifying a cow may mean that some cow foetuses do not develop to term and abort. This research raises ethical issues. Some people may think it is our responsibility to help people, whereas other may think transgenic technologies are unnatural or ‘playing God’.

**What you need**

* Intro article:[Transgenic cows](https://www.sciencelearn.org.nz/resources/834-transgenic-cows-introduction)
* Article: [Frameworks for ethical analysis](https://www.sciencelearn.org.nz/resources/2146-frameworks-for-ethical-analysis)
* Video clip: [Common ethical frameworks](https://www.sciencelearn.org.nz/videos/1359-common-ethical-frameworks)
* Video clip: [Which ethical framework?](https://www.sciencelearn.org.nz/videos/1360-which-ethical-framework)
* Student worksheet: [Modifying cows with human genes](#modify)

**What to do**

1. Discuss with the class the transgenic cow research programme at AgResearch. Use information and video clips in the Transgenic cows resource collection. Start with the [introductory article](https://www.sciencelearn.org.nz/resources/834-transgenic-cows-introduction).
2. Get students to search online for news articles on the transgenic cow research and to find out about some of the ethical issues this research raises.
3. Explain how ethical frameworks are used to help discuss ethical issues and to reach justified decisions on a course of action. Show the video clips [Common ethical frameworks](https://www.sciencelearn.org.nz/admin/videos/1359-common-ethical-frameworks) and [Which ethical framework?](https://www.sciencelearn.org.nz/admin/videos/1360-which-ethical-framework). You may wish to read this article to learn more about [ethical frameworks](https://www.sciencelearn.org.nz/resources/1497-using-ethical-frameworks-in-the-classroom).
4. Divide the class into small groups and have them complete the student worksheet: [Modifying cows with human genes](#modify).

|  |  |
| --- | --- |
| 1. Rights and responsibilities
2. Autonomy
3. Consequences
4. Virtue ethics
5. Rights and responsibilities
6. Consequences
 | 1. Autonomy – the right to choose for oneself
2. Multiple perspectives
3. Autonomy – the right to choose for oneself
4. Consequences
5. Consequences
6. Virtue ethics
 |

1. Have students discuss and justify their ideas. Some statements may fit into more than one framework.

**Modifying cows with human genes**

Scientists at AgResearch in New Zealand have successfully modified cows with a human gene to produce therapeutic proteins in their milk. These transgenic cow ‘bioreactors’ are a relatively fast and cheap way of making proteins that can be used to treat human diseases. A transgenic herd of cows could make enough protein to treat many people, and once established, the herd can be maintained by conventional breeding. However, the process of modifying a cow may mean that some cow foetuses do not develop to term and abort. This research raises ethical issues. Some people may think it is our responsibility to help people, whereas other may think transgenic technologies are unnatural or ‘playing God’.

**Ethical issue:** Should we modify cows with human genes to help treat human diseases?

**In which ethical framework does each statement fit best?** (The first one has been done)

R = Rights and responsibilities

C = Consequences

A = Autonomy and the right to choose for oneself

V = Virtue ethics

M = Multiple perspectives

|  |  |
| --- | --- |
| * 1. It is our responsibility to ensure that animals are looked after and not harmed by these technologies.

**Ethical framework:** \_\_\_\_\_\_\_\_**R**\_\_\_\_\_\_\_\_\_\_ | * 1. Genetic modification in health is a personal choice issue. Without genetically modified products in New Zealand, we would not be able to treat diabetics with insulin.

**Ethical framework:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| * 1. Our economy will benefit from the extra income generated from selling new treatments.

**Ethical framework:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | * 1. Adding human genes to animals is unethical and morally repugnant.

**Ethical framework:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| * 1. Our duty is to use scientific research to reduce human suffering.

**Ethical framework:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | * 1. This research will increase knowledge and expand science and innovation in New Zealand. We have to keep up with other countries.

**Ethical framework:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| * 1. I should be able to choose whether I want to buy medicines from GM animals or not.

**Ethical framework:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | * 1. It is wrong to interfere with whakapapa (the genealogy of people and indigenous species).

**Ethical framework:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| * 1. All genes are made up of the same material – DNA. It’s not a big deal to add a human gene to a cow.

**Ethical framework:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | * 1. We will benefit from cheaper, more readily available treatments for rare diseases.

**Ethical framework:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| * 1. We will damage our environment and put New Zealand’s ‘clean green’ reputation at risk.

**Ethical framework:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | * 1. It is wrong to tamper with nature by mixing genes between species.

**Ethical framework:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |