**ACTIVITY: Ethics, mice and toxins**

**Activity idea**

In this activity, students consider the use of mice for bioassays and in establishing the lethal dose when researching/testing for toxins. They consider the rights and responsibilities of all those affected by these methods and make a decision as to whether mice should be used in researching and testing for toxins.

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

* identify using animals in research or testing as a controversial issue
* demonstrate a scientific understanding of the controversial issue
* make a decision as to whether animals should be used in testing for toxins and be able to justify their decision

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**Introduction/background**

Animals are sometimes used in research or for scientific testing. Safe levels of toxins are determined using animals, usually mice. In the shellfish industry, mouse bioassays are used for monitoring shellfish safety. Mice are injected with shellfish extracts to determine whether they contain a toxin. If two out of three mice die within 24 hours, a toxin is said to be present and the sale of that particular shellfish is prohibited. More mouse bioassays are conducted until a time when a bioassay is done and the mice don’t die. Only then is that particular shellfish allowed to be sold.

Lethal dose 50 (LD50) is the dose of a substance required to kill half of a specific animal population. Mice are often the animal of choice in determining the LD50 of a toxin.

These testing methods may cause pain to the animals involved. It is often debated that it is morally wrong to cause animals to suffer. On the other hand, the knowledge of toxicity has saved many people’s lives, for example, by knowing what to avoid eating or knowing what levels of a chemical can be used in medication before it becomes harmful (toxic). This creates an ethical dilemma.

Students often have a strong sympathy for animals. This activity gives them the chance to explore the ethical question ‘Should mice be used for scientific testing?’ in relation to using mice in bioassays and establishing lethal dose for toxic substances in particular. Students can discuss their sympathies as well as consider some of the science involved and how this benefits people.

The Animal Welfare Act 1999 ensures that all research with animals follows ethical principles. Scientists and researchers using animals are aware of the ethics involved and acknowledge that experiments should be as humane as possible. Any research with animals requires ethical approval by a formal ethics committee. Researchers also use alternative testing methods rather than animals if they are available.

This activity uses the ethical approach concerning rights and responsibilities. Four other ethical approaches or frameworks are presented in the [Ethics thinking toolkit](https://www.sciencelearn.org.nz/resources/2363-ethics-thinking-toolkit) and can be used instead of or as well as rights and responsibilities.

**What you need**

* Copies of the articles [All in the dose](https://www.sciencelearn.org.nz/resources/365-all-in-the-dose), [Measuring toxicity](https://www.sciencelearn.org.nz/resources/366-measuring-toxicity), [Toxins and food webs](https://www.sciencelearn.org.nz/resources/367-toxins-and-food-webs) and [Monitoring shellfish](https://www.sciencelearn.org.nz/resources/372-monitoring-shellfish)
* Access to the video clips [Mouse bioassays](https://www.sciencelearn.org.nz/videos/172-mouse-bioassays), [LD50](https://www.sciencelearn.org.nz/videos/171-ld50), [The ethics of research animals](https://www.sciencelearn.org.nz/videos/1366-the-ethics-of-research-animals), [Is animal research needed?](https://www.sciencelearn.org.nz/videos/636-is-animal-research-needed) and [Ethics committees](https://www.sciencelearn.org.nz/videos/1332-ethics-committees)
* Access to the [Animal Welfare Act](http://www.legislation.govt.nz/act/public/1999/0142/latest/DLM49664.html) and a summary on the [Ministry for Primary Industries website](http://www.mpi.govt.nz/law-and-policy/legal-overviews/animal-welfare)
* Copies of the student handout: [Rights and responsibilities](#rights)

**What to do**

***Introducing the topic***

1. Ask the question ‘Should mice be used when testing for toxins?’. Ask students to discuss among themselves for about 1 minute in groups of two or three what this might mean and then get students to make a continuum line across the classroom from absolutely agree to absolutely disagree.
2. Ask students to think about why they are placing themselves where they do in the continuum. Is it based on personal experience? (It might be based on something they’ve seen or heard about.) Do they feel they need more information before they can make a decision? They might like to jot their reasons down.

***Investigating the science and the issue***

1. In groups or as a class, read and discuss [All in the dose](https://www.sciencelearn.org.nz/resources/365-all-in-the-dose) to learn about toxicity. Learn about lethal doses and mouse bioassays by reading [Measuring toxicity](https://www.sciencelearn.org.nz/resources/366-measuring-toxicity) and watching/listening to the video clips [Mouse bioassays](https://www.sciencelearn.org.nz/videos/172-mouse-bioassays) and [LD50](https://www.sciencelearn.org.nz/videos/171-ld50). [Toxins and food webs](https://www.sciencelearn.org.nz/resources/367-toxins-and-food-webs) explains bioaccumulation of toxins in seafood and the effects of these on people. [Monitoring shellfish](https://www.sciencelearn.org.nz/resources/372-monitoring-shellfish) explains why and how shellfish are monitored. It also offers an alternative to mouse bioassays.
2. Watch/listen to these video clips about animal testing: [The ethics of research animals](https://www.sciencelearn.org.nz/videos/1366-the-ethics-of-research-animals), [Is animal research needed?](https://www.sciencelearn.org.nz/videos/636-is-animal-research-needed) and [Ethics committees](https://www.sciencelearn.org.nz/videos/1332-ethics-committees).
3. Have a look at the [Animal Welfare Act](http://www.legislation.govt.nz/act/public/1999/0142/latest/DLM49664.html) and a summary on the [Ministry for Primary Industries website](http://www.mpi.govt.nz/law-and-policy/legal-overviews/animal-welfare)
4. Explore the internet to see what people are saying about animal testing. Note who the people or groups of people are who make the comments. Google ‘animal testing’ ‘animals in research’ and/or ‘against animal testing’.

***Using an ethical approach – rights and responsibilities***

1. As a class, brainstorm who or what is affected by this issue (for example, mice, scientists and researchers, chemists monitoring seafood, ordinary people such as iwi who depend on seafood, seafood lovers, people taking medications, animal rights groups, health organisations, the National Poisons Centre, pharmaceutical companies). Prioritise the list in terms of the most affected.
2. Divide the class into groups of 3–4. Allocate each a different affected group (use ones affected the most). Have the students discuss the questions concerning the rights and responsibilities of their particular affected group. Use the student handout [Rights and responsibilities](#rights) for questions and to record discussions.
3. Collate the rights and responsibilities of all affected groups and distribute to the class or record on board. (See example: [Should mice be used when testing for toxins?](#example))
4. As a class, discuss whether we value some rights more than others. Why? Whose rights do we want to protect? (For example, we value the right for people to live, that is, not to be poisoned, because most people would agree people are more important than animals. The rights of mice can also be considered though – the Animal Welfare Act requires that animals are looked after in laboratories. If other means of testing for toxins are made available, they should be used instead of mice.)
5. Debate. Selected teams could prepare and present to the class a debate for and against the topic ‘Mice should be used when testing for toxins’. The class can vote on the most persuasive delivery (showing a scientific understanding).
6. Make a class continuum again for the question ‘Should mice be used when testing for toxins?’ from ‘absolutely agree’ to ‘absolutely disagree’. Consider these questions:
* Have you changed your place in the line? Why? Why not?
* How did you make your decision? Did you draw on personal experience? Did you draw on new information?
* Do you need more information to make a decision?

**Student handout: Rights and responsibilities**

In this approach, we look at the rights and responsibilities involved. Rights and responsibilities are closely related – the rights of one imply the responsibilities (or duties) of another to ensure those rights.

Some questions that might be considered using this approach could be:

* Who/what is affected by this issue?
* Which groups have rights associated with this issue? What are their rights?
* Which groups have responsibility to ensure that the rights are achieved?
* Do we value some rights more than others? Whose rights do we want to protect?
* Do any codes, declarations and/or conventions relate to this issue?

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| **SHOULD MICE BE USED WHEN TESTING FOR TOXINS?** |
| **Considering the rights and responsibilities of:** |  |
| **Does this group have any rights? What are they?** |
| **Does this group have any responsibilities? What are their responsibilities that ensure that others’ rights are achieved?** |
| **Are there any codes or declarations that support the rights and/or responsibilities of this group?** |

**Example: Should mice be used when testing for toxins? Rights and responsibilities of three affected groups**

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| --- | --- | --- |
| **Group** | **Rights** | **Responsibilities** |
| **Iwi – rely on seafood as a staple part of their diet** | * The right to eat food from the sea.
* The right to know whether or not the seafood is safe (not toxic).
* The right to know about toxins and toxic levels so they can be safe.
 | * To be aware of and check for toxicity levels of shellfish and other seafood before eating it.
* To learn about various marine toxins, how they can affect people and what to do if someone is affected.
* To choose other foods in case of contamination.
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| **Laboratory mice** | * The right to proper and sufficient food and water.
* The right to adequate shelter.
* The right for the opportunity to display normal patterns of behaviour.
* The right to have physical handling in a way that minimises the likelihood of unreasonable or unnecessary pain or distress.
 | * None
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| **Scientists – monitor shellfish safety** | * The right to use mice to test for toxins if they can’t test for them any other way.
* The right not to be abused for using animals (if necessary) to keep people safe.
 | * To care for mice according to their rights – keeping suffering to a minimum.
* To use methods other than mice to detect toxins and determine toxicity levels once these have been established for a particular toxin.
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