**Unit plan: Ethics in sheep breeding**

**Overview**

Students develop their knowledge of selective sheep breeding so they can formulate an argument and make ethical decisions about breeding easy care sheep.

**Purpose**

To use growing science knowledge about selective sheep breeding when considering issues in breeding programmes to produce easy care sheep. Students should be able to describe easy care sheep and to list stakeholders involved in the breeding programme. Students will explore the consequences (including rights and responsibilities and virtue ethics) for the stakeholders and make justified decisions about the breeding programmes.

**Background**

***Suggestions for a scenario***

After learning about selective sheep breeding and the production of easy care sheep, the students role-play the stakeholders involved. A ‘meeting’ is convened to determine whether or not a sheep breeding programme producing easy care sheep should commence. The stakeholders argue their case.

***Using ethical frameworks***

Use of an [ethical framework](https://www.sciencelearn.org.nz/resources/1497-using-ethical-frameworks-in-the-classroom) may be used to complete the summative assessment activity described in this unit. The consequentialism approach relates well to the focus of the learning activities. You may also wish to use an ethical framework in a formative capacity in small groups, using a different ethical approach such as multiple perspectives or virtue ethics.

The following video clips provide a brief introduction to teaching ethics and the different ethical approaches you can use to support students in developing ethical thinking.

[Introducing ethics in teaching](https://www.sciencelearn.org.nz/videos/1362-introducing-ethics-in-teaching)

[Reaching ethical consensus](https://www.sciencelearn.org.nz/videos/1364-reaching-ethical-consensus)

[Common ethical frameworks](https://www.sciencelearn.org.nz/videos/1359-common-ethical-frameworks)

***Ethics and biotechnology***

Ethics is a crucial part of the nature of biotechnology. Selective breeding is manipulating the breeding of sheep to capture the traits you want. This is to genetically modify sheep without bringing in anything from an outside gene pool. Scientists already have all the traits they want but in different sheep (for example, some have short tails and others have bare backsides). They find the sheep with those traits and breed them to produce the traits they want in one sheep (a sheep that has a short tail and a bare backside). However, the technological outcome has ethical implications.

There seem to be lots of advantages to getting the sheep farmers want – economically for the farmer and for the welfare of the sheep. However, the Rare Breeds Conservation Society may not be too happy, the animal ethics committee would like to explore the issue and there may be possible disadvantages for the sheep. The ethics need to be explored.

**Curriculum focus**

***Technology***

Selective sheep breeding is manipulating animals to breed them for a particular purpose – economics mostly. Listen to the video clips and read the information sheets to learn more about selective sheep breeding and easy care sheep.

***Science***

Learn about traits or characteristics in sheep and the heritability of these. The desired traits in easy care sheep are a short tail, bare backside, bare belly, bare legs and bare head. Correlated responses are improved fertility and growth rate. Are there any undesired traits? What happens with inbreeding? Could inbreeding be a possibility? Will the traditional breeds be bred out and lost?

**Health and safety**

Cyber safety considerations should be a part of your planning when you direct your students to use the internet. You may want to teach students some OOS avoidance strategies for computer use.

**Resources**

For additional resources go to the activity: [Selective sheep breeding noisy round robin and PMI](https://www.sciencelearn.org.nz/resources/825-selective-sheep-breeding-noisy-round-robin-and-pmi)

**Useful Links**

**Using animals in science**

The Australian and New Zealand Council for the Care of Animals in Research and Teaching website has resources designed for school teachers and students.

<http://anzccart.org.nz/schools/>

**The Animal Welfare Act**

A guide to the Animal Welfare Act 1999 is provided here on the Biosecurity New Zealand website.

<http://www.mpi.govt.nz/law-and-policy/legal-overviews/animal-welfare/>

**Crutching sheep**

Provides an explanation about crutching, why and how it’s done, including images.

[www.coast2coastnz.com/?p=564](http://www.coast2coastnz.com/?p=564)

**New Zealand sheep breeds**

Find out more about New Zealand sheep breeds, their history, origin and physical characteristics, including images.

<http://www.nzsheep.co.nz/index.php?page=sheep-breeds>

**Rare breeds**

The New Zealand Rare Breeds Conservation Society website records rare and endangered livestock breeds.

[www.rarebreeds.co.nz](http://www.rarebreeds.co.nz)

| **Suggested learning intentions** | **Suggested learning experiences** | **Possible teaching/assessment activities** |
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| **Introduction – understanding the science** | | |
| Understand what selective breeding is.  There are numerous breeds of sheep – each breed shows certain characteristics.  A characteristic or trait is a particular aspect of the sheep, for example, horns – some sheep have horns and some don’t.  When 2 sheep breed, the traits of either sheep can be produced in the young.  Selective breeding is when people choose which traits they want and just breed those particular sheep to get the desired traits.  Extension discussions could include genotypes and phenotypes. | Display sheep images of various breeds. Use images from the [media gallery](https://www.sciencelearn.org.nz/?search=true&query=sheep) or search for others in [Useful links](#Useful_links).  As a class discuss sheep breeding.   * What does breed of sheep mean? * What are sheep characteristics (traits)? * What do you think selective sheep breeding means? * How might this be done?   After discussion, view videos:   * [Sheep breed origins](https://www.sciencelearn.org.nz/videos/411-sheep-breed-origins) * [Selective breeding, cloning and GM](https://www.sciencelearn.org.nz/videos/406-selective-breeding-cloning-and-gm) * [Heritability of sheep traits](https://www.sciencelearn.org.nz/videos/403-heritability-of-sheep-traits) * [Sheep breeding and biodiversity](https://www.sciencelearn.org.nz/videos/412-sheep-breeding-and-biodiversity)   Look at original ideas and add or change new information on class chart | Record students’ ideas on class chart.  Watch videos.  Add/change new ideas to  original class chart. |
| **Understanding the technological outcome** | | |
| What are easy care sheep?   * From many different (original) breeds. * Have less wool on belly, backside and legs and have short tails. | In pairs, discuss what easy care sheep might be. Think about which sheep might be hard to care for. Share ideas as a class.  View the video clip [Developing easy care sheep](https://www.sciencelearn.org.nz/videos/400-developing-easy-care-sheep) and read the article [Finding easy care sheep traits](https://www.sciencelearn.org.nz/resources/822-finding-easy-care-sheep-traits).  Describe easy care sheep. | Watch video clip.  Draw a sheep with ‘easy care sheep’ written in the middle and ‘mind map’ easy care traits around it. |
| **Introducing the ethical question** | | |
| This could be a pre-assessment task or just a warm-up activity. | Write up the question: Should scientists breed easy care sheep?  Ask students to think about the question carefully. Students then move to a position on a line that represents their view. At one end of the line are people who absolutely agree with that statement. At the other end of the line are people who totally disagree with that statement. Others line up between them – moving closer to either end depending on the strength of their view. The unsure students would be in the middle. | People continuum. |
| **Research (developing knowledge)** | | |
| Students investigate the benefits and harms of breeding easy care sheep. | Students could work in small groups to research the pros and cons of breeding easy care sheep. This research could include viewing videos:   * [Easy care sheep benefits](https://www.sciencelearn.org.nz/videos/408-easy-care-sheep-benefits) * [Dags and flystrike](https://www.sciencelearn.org.nz/videos/405-dags-and-flystrike) * [Possible risks of easy care sheep](https://www.sciencelearn.org.nz/videos/410-possible-risks-of-easy-care-sheep)   and reading articles:   * [Easy care sheep traits](https://www.sciencelearn.org.nz/resources/813-easy-care-sheep-traits) * [The need for easy care sheep](https://www.sciencelearn.org.nz/resources/817-the-need-for-easy-care-sheep) * [Breeding easy care sheep](https://www.sciencelearn.org.nz/resources/814-breeding-easy-care-sheep) * [Finding easy care sheep traits](https://www.sciencelearn.org.nz/resources/822-finding-easy-care-sheep-traits)   and searching the internet for information on:   * flystrike in sheep * dagging and crutching in sheep * inbreeding in sheep * facial eczema * the National Animal Ethics Advisory Committee and sheep welfare (what are the legal requirements for scientists breeding sheep?)   **Benefits:**   * Reducing/eliminating fly strike, crutching and dagging. * Saving money by not having to do these things (less care for sheep). * Producing healthier sheep (Animal Ethics Committee happy). * Lower cost sheep (less wool so less shearing time and fewer shearers). * Easier to shear. * Easy handling of wool. * More fertile sheep. * Quicker growth rate. * Consumers value food and wool products with minimal chemical input.   **Harms:**   * Facial eczema (skin exposed to sunlight). * Problems with productivity (people not wanting sheep with facial eczema). * People’s perception that sheep will get too cold without lots of wool, especially in the South Island. * Possible loss of traditional breeds (if they are bred out). * Possible inbreeding when breeding with small numbers. This affects the immune system and the reproductive system. Means fewer lambs and those that are produced are less likely to survive. | Students research in small groups.  View videos.  Read information sheets.  Search internet.  Make notes on benefits and harms of breeding easy care sheep. |
| **Ethical perspectives** | | |
| What is a consequence?  Students should understand they could be positive or negative. (Note: young students often perceive a consequence as something negative.)  Students should be aware of what or who could be affected, for example, sheep, farmers, scientists, animal ethics committee, vets, shearers, farm workers, rare breeds society.   * What are the benefits? * What are the harms?   Rights and responsibilities:   * Which groups have rights associated with this issue? * What are their rights? (Check Animal Ethics Committee for sheep’s rights.)   Do these groups also have responsibilities? What are their responsibilities?  Virtue ethics – does breeding easy care sheep make us better people? Why? Why not?  Appreciating virtues can be developed through ethical thinking – care, valuing the natural environment. | Class discussion of what you think a consequence is.  A space-jump activity could help with understanding of consequences (if necessary):   * The class is seated in a circle. One student mimes an action in the middle (e.g. eating an ice cream). They freeze. * Another student comes in and mimes the first student’s action and then adds another action that is a consequence of the first action (e.g. the ice cream drops off onto the ground). They freeze, then mime the two actions sequentially backwards. * The class discusses what the consequence is. * Another student comes out, acts out the first 2 mimes, adds a third, freezes, then mimes the sequence backwards. * This continues for up to 5 actions. * Then start with another series of consequences. * The class discusses the consequences for each action. * This helps students to realise consequences can be positive or negative.     You could conclude by showing the first part of the video clip [Common ethical frameworks](https://www.sciencelearn.org.nz/videos/1359-common-ethical-frameworks), which briefly explains consequentialism – stop the video clip at the end of that section.  Discuss who would be affected by breeding easy care sheep and make a class list.  Generate harms and benefits (consequences) of easy care sheep breeding using the noisy round robin strategy. Use a series of PMIs for collating consequences to stakeholders during the noisy round robin. For example, from a sheep’s point of view, what are the benefits or harms of being an easy care sheep? (Some benefits are no flystrike, dags, crutching, docking or chemical treatments, easier time being shorn. Some harms might be facial eczema and inbreeding).  Introduce rights and responsibilities by showing the second section of the video clip [Common ethical frameworks](https://www.sciencelearn.org.nz/videos/1359-common-ethical-frameworks) – stop the video at the end of that section.  As a class, discuss therights of the sheep and of the farmer. Are the rights of the sheep affected by the easy care breeding project (for example, the sheep’s right to breed according to nature)? Are the rights of the farmer affected (for example, the right to make their own decisions about how they breed their sheep)?  Having bred sheep to hold a lot of wool in the past, do farmers/scientists now have a responsibility to breed sheep to live more comfortably?  Does breeding easy care sheep cause people to become better people? (People might be more caring and thoughtful towards animals’ needs.)  Students could discuss this in groups using the [virtue ethics approach](https://www.sciencelearn.org.nz/resources/1497-using-ethical-frameworks-in-the-classroom). | Discussion  Space-jump  Class discussion – make a class list  [Selective sheep breeding noisy round robin and PMI](https://www.sciencelearn.org.nz/resources/825-selective-sheep-breeding-noisy-round-robin-and-pmi)  Class discussion – rights and responsibilities  Class discussion – virtues  Record of group discussion |
| **Ethical deliberation and justification** | | |
| Students take a viewpoint and argue their case from that view. A decision is then made after hearing all the stakeholders’ views. | A meeting is held to determine whether or not the easy care  sheep breeding programme can go ahead or not. The students all take on roles of people who might be involved (scientists, farmers, Animal Ethics Committee, vets, Rare Breeds Conservation Society etc.). Students present their case in the meeting as to whether they think the programme should take place. A vote could determine the outcome at the end. | Role-play – meeting to determine the outcome of an easy care sheep breeding programme. |
| **Assessment – transactional writing** | | |
| Students make a decision with justification. | Students write an account of the benefits and harms of easy care sheep breeding. They should state their own view and give reasons to support it. This could include refuting possible counter arguments.  Students could complete this activity using the [consequentialism approach](https://www.sciencelearn.org.nz/resources/1497-using-ethical-frameworks-in-the-classroom).  Make a people continuum across the room as was done at the beginning of the unit – from those who agree to an easy care breeding programme to those who do not.  Who has changed their mind? Has the information made a difference to your decision? Your decision may be the same but you may feel a lot more informed now. | Argument writing (assessment).  People continuum. |