Stage 5 – Agricultural Technology – Sheep management

Sheep production in Australia has traditionally been one of the most successful industries, with much of the country’s agriculture being built on the sheep’s back. Students examine the history of sheep production in Australia for both prime lambs and wool, and explore the many facets of growing, improving, marketing and producing environmentally sustainable sheep products, across both enterprises.

**Duration:** Sample term- 10 weeks

* 6 weeks- prime lamb production
* 4 weeks- wool production

## Outcomes

* **AG5-1** explains why identified plant species and animal breeds have been used in agricultural enterprises and developed for the Australian environment and/or markets
* **AG5-4** investigates and implements responsible production systems for plant and animal enterprises
* **AG5-5** investigates and applies responsible marketing principles and processes
* **AG5-7** explains and evaluates the impact of management decisions on animal production enterprises
* **AG5-8** evaluates the impact of past and current agricultural practices on agricultural sustainability
* **AG5-9** evaluates management practices in terms of profitability, technology, sustainability, social issues and ethic
* **AG5-10** implements and justifies the application of animal welfare guidelines to agricultural practices
* **AG5-11** designs, undertakes, analyses and evaluates experiments and investigates problems in agricultural contexts
* **AG5-12** collects and analyses agricultural data and communicates results using a range of technologies
* **AG5-13** applies Work Health and Safety requirements when using, maintaining and storing chemicals, tools and agricultural machinery
* **AG5-14** demonstrates plant and/or animal management practices safely and in collaboration with others

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## Unit overview

The aim of the Agricultural Technology Years 7-10 Syllabus is to actively engage students in learning about animal and plant production, enabling them to evaluate the interactions between plants, animals, technology, the economy and consumers. Students develop confidence and proficiency in their practical interactions in handling and growing livestock across a variety of enterprises.

Animal enterprises are directly influenced by climate, available technology, the economy, and market trends. Students will explore historical and current trends in animal production and investigate factors that influence decision making in animal enterprises. Students will have opportunities to learn how to interact with and handle livestock in a safe and environmentally sustainable manner.

## Resources overview

The resources and links listed below are referenced within the program but is not an exhaustive list of resources available. Teachers can add to these resources as needed.

### Physical resources

* Computers with internet connectivity
* Sheep husbandry tools, for example drench gun, ear tag gun
* Weigh scales for sheep
* Chemical label for a sheep drench
* Wool samples
* Synthetic fibre samples

### Websites

* [learnaboutwool.com/resource-library](https://www.learnaboutwool.com/resource-library/) - [wool production in Australia pdf](https://www.learnaboutwool.com/globalassets/law/resources/factsheets/primary/gd0346-primary-fact-sheets_g_4_inter.pdf)
* [sheepcentral.com](https://www.sheepcentral.com/south-australia-and-new-south-wales-producers-leading-in-flock-development/) - Where do you think all the sheep in Australia are?
* [Auctionsplus.com.au](https://auctionsplus.com.au/)
* [makingmorefromsheep.com.au](http://www.makingmorefromsheep.com.au/market-focussed-lamb-and-sheepmeat-production/tool_3.2.htm) - Module 3: Market Focused Lamb and Sheep meat Production
* [nswschoolanimals.com](http://nswschoolanimals.com/)
* [apvma.gov.au](https://apvma.gov.au/) - [Understanding pesticide chemical labels](https://apvma.gov.au/sites/default/files/publication/67431-understanding_labels_booklet_2020.pdf)
* [theland.com.au](https://www.theland.com.au/story/5531278/no-shear-if-not-the-right-gear/?cs=4963) - Safety first in shearing sheds
* ABC News
	+ [Shearing contractors call for better workplace conditions amid shearer shortage](https://www.abc.net.au/news/rural/2018-11-20/new-zealand-shearer-shortage-pressure-for-australian-contractors/10511606) (duration 1:12)
	+ [Live sheep exports could be banned after this federal election, but WA breeders warn against it](https://www.abc.net.au/news/2019-04-22/wa-farmers-warn-against-labors-live-export-ban/11035684)
	+ [How ear tags are transforming the sheep and goat industry](https://www.abc.net.au/news/2018-06-23/how-ear-tags-are-transforming-the-sheep-and-goat-industry/9896342)
* [bigmerino.com.au/history-of-wool](https://www.bigmerino.com.au/history-of-wool/)
* [sheepgenetics.org.au/Getting-started/ASBVs-and-Indexes](http://www.sheepgenetics.org.au/Getting-started/ASBVs-and-Indexes)
* [zoetis.com.au](https://www.zoetis.com.au/livestock-solutions/southern-beef/effective-parasite-management/internal-parasites.aspx) – Internal parasites
* [Woolwise.com](https://www.woolwise.com/educational-resources/) - [Lecture 7: Methods for meeting lamb market specifications and marketing](http://www.woolwise.com/wp-content/uploads/2017/07/WOOL-412-512-12-T-07.pdf)
* [awex.com.au](http://www.awex.com.au/) - [Australian Wool at a glance pdf](http://www.awex.com.au/media/1848/awex-student-project-card-2019_d4.pdf)
* [livestocklibrary.com.au](http://www.livestocklibrary.com.au/) - [Australian Sheep Breeding Values (ASBVs) - A guide for ram breeders (Version 5)](http://www.livestocklibrary.com.au/bitstream/handle/1234/35512/SheepCRC_32_6.pdf?sequence=1)

### YouTube:

* [Best practice sheep handling](https://www.youtube.com/watch?v=JIm_suD265g) (duration 7:22)
* [How to drench orally](https://www.youtube.com/watch?v=DoicpFUxbfs)(duration 2:15)
* [Gallagher Sheep Handler - Auto Weigh, Crutch and Dag in action](https://www.youtube.com/watch?v=e3GZ8r5XUv4) (duration 3:03)
* [Aboriginal water values and management in northern Australia](https://www.youtube.com/watch?v=XMKYybtUJ-o) (duration 14:16)
* [CFA Bruce Pascoe- Traditional Aboriginal Land Management Practices](https://www.youtube.com/watch?v=UTO1XpkcALM) (duration 9:09)

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| Content | Teaching and learning | Evidence of learning | Adjustments and registration |
| **Week 1*** Identify the characteristics of animal breeds and plant types specific to chosen enterprises.
 | **Introduction to unit:****Teacher:*** Overview of sheep production unit and assessment tasks.

**Students:*** Research definitions and complete vocabulary table for sheep terminology in student workbook.
* Research a range of common sheep breeds to complete the sheep breeds table in the student workbook. Including, preferred environment, main products produced, characteristics and wool fibre diameter information.
* Choose one breed of interest and create an in-depth profile for it.
 | * Students record definitions for all sheep terms outlined in their workbooks.
* Students use appropriate specialist terminology when researching and completing sheep breed profiles.
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| * Describe an animal enterprise
* Select and use ICT in the analysis and presentation of agricultural data related to the animal enterprise (ACTDEP052)
 | **Prime lamb production****Teacher and students:*** Discuss the main wool and prime lamb producing areas of Australia. Use maps to support visual learners. Utilise learn about wool – [wool production in Australia fact sheet](https://www.learnaboutwool.com/lesson-plans/fibre-production/) and sheep central – [where do you think all the sheep in Australia are?](https://www.sheepcentral.com/south-australia-and-new-south-wales-producers-leading-in-flock-development/)

**Students:*** Use Excel to graph sheep population numbers in Australia over time and analyse the data to identify trends.
* Identify trends in the graph to describe changes in sheep populations.
 | * Students complete a map showing main sheep production areas of Australia and can identify environmental conditions that support sheep production.
* Students use digital technology skills to produce a graph depicting sheep population numbers
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| **Week 2*** Assess the effectiveness of marketing strategies for an agricultural product (ACTDEK044)
* Research the markets available for chosen animal agricultural products
 | **Teacher and students:*** Use [AuctionsPlus](https://auctionsplus.com.au/) to find and look at current sheep auctions.

**Students:*** Complete student workbook activities for three auctions listed on AuctionPlus.
* Research other ways of marketing live sheep for sale. Complete the activities in the student workbook.

**Extension*** Visit a saleyard to view a live auction.
 | Students can articulate benefits and disadvantages of a range of marketing strategies used to sell agricultural products. |  |
| * Assess market specifications required to market chosen animal agricultural products
 | **Teacher and students*** Use sheep market specifications worksheet to complete table of market specifications for sheep. Refer to website: [www.makingmorefromsheep.com.au](../0.%20To%20Do/Ag%20Sheep%20management/www.makingmorefromsheep.com.au/market-focussed-lamb-and-sheepmeat-production/tool_3.2.htm)

**Students*** Using either school records from abattoirs, or the example data in the student workbook, determine what markets could be available to sell the lambs to.
 | * Students use knowledge of market criteria to successfully allocate individual animals into appropriate markets based on their size and fat score.
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| **Week 3*** Investigate a range of important animal management skills
* Investigate technologies that assist in record-keeping and monitoring an animal enterprise and its performance (ACTDEK047)
* Plan and undertake procedures in the management of an animal enterprise within welfare guidelines (ACTDEP048, ACTDEP050)
* Investigate and implement a range of animal husbandry operations, following animal welfare guidelines, including Animals in Schools (ACTDEK044)
* Investigate the timing and impact of relevant operations in an animal production cycle
* Collect accurate evidence and record relevant data relating to the animal enterprise
 | **Teacher and students*** Research relevant husbandry operations within a sheep enterprise. For each operation, create a table that includes name of operation, what is carried out during the task, when is the ideal time for this to occur. Examples could include joining, lambing, castration, ear tagging, vaccination, drenching, shearing etc.
* Watch Department of Education – learning systems [Best practice sheep handling](https://www.youtube.com/watch?v=JIm_suD265g) (duration 7:22)
* Watch Ag RecordNZ [How to drench orally](https://www.youtube.com/watch?v=DoicpFUxbfs)(duration 2:15).
* Work as a class to complete a calendar of operations for the school sheep flock based on their background knowledge and what they have researched about husbandry operations. Complete the activity in the student workbook.

**Teacher*** Demonstrate a range of sheep husbandry tools to students, explaining uses.

**Students*** Complete the sheep handling – husbandry equipment activity in the student workbook.

**Practical activities*** Complete the following practical activities using the school flock. Ensure animal welfare guidelines are adhered to at all time ([NSW Animals in Schools](http://nswschoolanimals.com/sheep/))
* Predict liveweight of sheep
* Weigh sheep and record data over successive dates to calculate growth rate
* Mouth sheep to determine age
* Drench sheep (use water where drench is not required)
* Draft sheep based on sex/age/breed
* Fat and condition score a mob of sheep (student activity in workbook)

**Students*** Collect photos of sheep teeth of different ages and complete mouthing activity in student workbook.
* Develop a system of collecting and recording accurate data relating to the school sheep flock. Investigate technology based data collection systems.

**Optional*** Watch [Gallagher Sheep Handler - Auto Weigh, Crutch and Dag in action](https://www.youtube.com/watch?v=e3GZ8r5XUv4) (duration 3:03)
* Students to create an advertisement for the automatic draft weigh system
 | * Students activity participate in practical activities in a safe manner, following teacher directions.
* Students can identify a range of husbandry activities and tools required to carry them out.
* Students can associate certain husbandry activities with different times of the year according to the age of the sheep or environmental factors.
* Students use a range of industry specific terminology when explaining the activities that occur in sheep production.
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| **Week 4*** Explore Aboriginal land management practices (ACTDEK040)
* Explore the effect of European and Aboriginal agricultural practices on agricultural production and environmental sustainability (ACTDEK040)
* Evaluate current sustainable and unsustainable agricultural animal management practices (ACTDEK044)
 | **Teacher and students*** Explore Aboriginal land management practices of following the seasons for food and only harvesting crops and animals that are abundant during the season as well as managed burning.
* Watch CSIRO [Aboriginal water values and management](https://www.youtube.com/watch?v=XMKYybtUJ-o) (duration 14:16) and [CFA Bruce Pascoe- Traditional Aboriginal Land Management Practices](https://www.youtube.com/watch?v=UTO1XpkcALM) (duration 9:09) for building student knowledge.
* Discuss the differences between traditional use of the land by Aboriginal people and agricultural practices for food production today.

**Students*** Create a list of similarities and differences in the student workbook.
* Evaluate the effect of one of the Aboriginal land management practices on environmental sustainability using the scaffold in the student workbook.
* Complete the activity in the student workbook on sustainable and unsustainable sheep farming practices.
 | * Students can verbally identify a range of sustainable and unsustainable land management techniques and discuss the difference between Aboriginal land management practices and modern day practices
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| **Week 5*** Identify and apply ethical and WHS practices (ACTDEP050)
* Conduct safe handling and storage of chemicals
 | **Teacher*** Define WHS and outline the WHS Act NSW 2011.

**Teacher and students*** Identify situations within the sheep enterprise and agriculture farms in general where WHS practices may be applicable. For example, where Personal Protective Equipment (PPE) is required to be used, safe use of tools and awareness of hygiene.
* Read through the chemical safety section of Dynamic Agriculture” 4th Edition textbook as a class. Discuss why safe use of chemicals is necessary for the applicator, general public and the environment.
* Read through the Understanding Pesticide chemical labels information sheets.

**Students*** Use the information from the [Understanding Pesticide chemical labels](https://apvma.gov.au/sites/default/files/publication/67431-understanding_labels_booklet_2020.pdf) to complete the Interpreting a chemical label activity in the student workbook.
* Read the article [safety first in shearing sheds](https://www.theland.com.au/story/5531278/no-shear-if-not-the-right-gear/?cs=4963) and complete the activity in the student workbook.

**Practical*** Watch a teacher demonstration for calibrating a drench gun.
* Calibrate a drench gun using a drench label and the school sheep flock as your data references.
 | * Students can identify a range of safe and unsafe practices on a farm and in a sheep production system.
* Students can locate a range of features on a chemical label.
* Students actively participate in calibrating a drench gun under the guidance of the teacher
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| **Week 6*** Investigate the social and ethical issues that affect the chosen animal enterprises (ACTDEK040)
* Research an agricultural issues relevant to the animal enterprise and propose possible solutions (ACTDEK044)
 | **Teacher and students*** Read the article [shearing contractors call for better workplace conditions amid shearer shortage](https://www.abc.net.au/news/rural/2018-11-20/new-zealand-shearer-shortage-pressure-for-australian-contractors/10511606) and discuss the main points raised within the article.

**Students*** Complete the activity agricultural issues-shearer shortage in the student workbook.

**Teacher and students*** Read the article [live sheep exports could be banned after this federal election, but WA breeders warn against it](https://www.abc.net.au/news/2019-04-22/wa-farmers-warn-against-labors-live-export-ban/11035684) and discuss the main points raised within the article.

**Students*** Complete the activity agricultural issues-live exports in the student workbook.

**Optional extension*** Conduct a class debate for and against live export of sheep.
 | * Students participate in discussions about social and ethical issues faced by the sheep industry. They can outline both sides of an argument.
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| * Describe an animal enterprise
* Draw conclusions from evidence and analysis of data
 | **Wool production****Students** * Read the [History of wool](https://www.bigmerino.com.au/history-of-wool/) article and complete the activity in the student workbook, Merino’s in Australia.
* Complete the ‘wool production in Australia’ activity in the student workbook.
 | * Students complete a graph showing wool production in Australia and can articulate why the wool industry is important to Australia.
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| **Week 7*** Identify some of the programs, techniques and tools used in animal breeding and analyse their impact on production (ACTDEK046)
 | **Students** * Draw and label the parts of the sheep reproductive systems
* Create a table showing part and function of the reproductive organs.

**Teacher and students*** Define various breeding systems such as crossbreeding, inbreeding, outbreeding and linebreeding. Analyse their impact on production.
* Investigate the use of Australian Sheep Breeding Values (EBV’s) in the sheep industry. [ASBVS and indexes explained](http://www.sheepgenetics.org.au/Getting-started/ASBVs-and-Indexes). Discuss how the use of ASBVs can impact production in the sheep industry.

**Students*** Complete the activity ASBVs impact on sheep production in the student workbook.
 | * Students complete accurate diagrams of reproductive systems.
* Students can distinguish between a range of common breeding systems used in sheep production.
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| **Week 8*** Analyses nutritional requirements for the production cycle of an animal
 | **Students** * Draw and label the parts of the sheep/ruminant digestive systems.
* Create a table showing part and function of the digestive organs.

**Teacher and students** * Research the dietary requirements of sheep. Include information on protein and carbohydrates. Discuss why nutritional needs will vary depending on the class, age, condition of sheep.

**Students*** Complete the dietary requirements of sheep activity in the student workbook.
* Develop a feed plan for the school sheep using the activity in the student workbook
 | * Students complete an accurate diagram of the ruminant digestive system.
* Students develop a suitable feed plan for the school flock.
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| **Week 9*** Investigate the effect of beneficial and harmful microorganisms and invertebrates on plant and/or animal production
 | **Teacher and students*** Use the [Effective parasite management](https://www.zoetis.com.au/livestock-solutions/southern-beef/effective-parasite-management/internal-parasites.aspx) website to research information about internal and external parasites of sheep. Complete the Sheep Diseases activity in the student workbook using this information.
* Discuss what is a zoonotic disease and how they can be transmitted. Discuss how they can be controlled.

**Students*** Research one example of a zoonotic disease that sheep can have and complete the Zoonotic disease activity in the student workbook.

**Teacher and students*** Discuss the term biosecurity and what it means. Relate biosecurity to the school farm, what practices are in place to prevent major disease outbreaks.
* Explain quarantine and why it is used as an effective practice in maintaining biosecurity controls on a farm.

**Students*** Complete the biosecurity activity in the student workbook
 | * Students can articulate why some internal and external parasites are bad for sheep production.
* Students participate in discussions about biosecurity and the practices used on the school farm.
* Students follow basic biosecurity practices when working on the school farm.
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| **Week 10*** Select and use technologies to assist effective animal management practices. (ACTDEK047)
* Identify emerging technologies that affect sustainability (ACTDEK041)
 | **Teacher and students** * Read [how ear tags are transforming the goat industry](https://www.abc.net.au/news/2018-06-23/how-ear-tags-are-transforming-the-sheep-and-goat-industry/9896342) article as a class and discuss the use of tags in livestock traceability.
* Identify the different forms of NLIS tags on the school farm. How are the animals traced from one property to another (if possible, show students the NLIS database where transactions occur).

**Students*** Complete the sheep management technology- NLIS tagging activity in the student workbook.
 | * Students can identify NLIS tags and property management tags on the farm, explaining the difference between the two.
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|  | **Optional**Collect and analyse three samples of wool or natural fibres and examine under the microscope.Compare the natural wool fibre to a synthetic fibre. | * Students can accurately draw wool and other fibre samples.
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## Evaluation

Evaluation of learning activities should be an ongoing process that happens throughout the delivery of this unit. Teachers should document their evaluation of learning activities throughout the program. The space provided below is to evaluate the overall unit of work.

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