

Alpacas From Farm to Fibre TEACHER GUIDE

LESSON 3

YEAR 5-6









LESSON 3

Alpacas From Farm to Fibre

LEARNING AREAS / YEAR LEVEL

Design and Technologies (Year 5–6) Science (Year 5–6)

AUSTRALIAN CURRICULUM CONTENT

Examine how particular structural features and behaviours of living things enable their survival in specific habitats (**AC9S5U01**)

Investigate how scientific knowledge is used by individuals and communities to identify problems, consider responses and make decisions (AC9S5H02)

Construct and use appropriate representations, including tables, graphs and visual or physical models, to organise and process data and information and describe patterns, trends and relationships (AC9S5I04)

Investigate the physical conditions of a habitat and analyse how the growth and survival of living things is affected by changing physical conditions (AC9S6U01)

Explain how and why food and fibre are produced in managed environments (AC9TDE6K03)

This work is licensed under CC BY-NC 4.0. To view a copy of this license, visit http://creativecommons.org/licenses/by-nc/4.0/









Contents

Learning Areas / Year Level	Page 2
Australian Curriculum content	Page 2
Lesson Objective	Page 3
Lesson Overview	Page 3
Resources and Equipment	Page 4
Lesson Guide	Pages 5–8
Student Resources	Page 9
Answers	Pages 10–13
References	Page 14
Student Worksheets 🦬	Page 15

LESSON OBJECTIVE

Students will learn about adaptations using the alpaca as an example. Structural features and behaviours of alpacas are examined and used to annotate a life-sized model using data from the Australian Alpaca Association. They will also learn about converting alpaca fibre into products for sale by sequencing each process to create a flowchart.

LESSON OVERVIEW

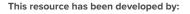
Activity 3.1 – Features and Adaptations of Alpacas (20 minutes)

Activity 3.2 – Build an Alpaca (45-60 minutes)

Activity 3.3 – Supply Chain Flowchart (40-60 minutes)















Resources and Equipment

ACTIVITY 3.1 – Features and Adaptations of Alpacas

- Worksheet 3.1a Suri and Huacaya Features (Observation activity)
- 2. Worksheet 3.1b Suri and Huacaya Features (Literacy activity)
- 3. Highlighters, scissors, glue, ruler
- 4. Worksheet 3.1c Adaptations (Literacy activity)
- 5. Alpaca sounds: the alarm call (1:10)
- 6. Alpacas love dust bathing! (0:52)
- 7. What makes Australia a great home for the Alpaca (1:18)

ACTIVITY 3.2 - Build an Alpaca

- 1. Worksheet 3.2a Building a Model Alpaca Datasheet (Modelling activity)
- 2. Meter rulers/ tape measure, lead pencils
- Either: Option 1: Cement/asphalt area and chalk, OR
 Option 2: Butchers paper, sticky tape and markers

ACTIVITY 3.3 – Supply Chain Flowchart

- 1. Butchers paper and markers
- PIEFA Food and Fibre Card Game | Australian Alpaca Association Supply Chain Game Cards (printed, cut into individual cards and preferably laminated). If using for the first time, laminator and scissors
- 3. Instructions PIEFA Food and Fibre Card Game | Australian Alpaca Association Supply Chain
- 4. Why Alpaca is the Smart Future for Australia (0:00–4:25)
- 5. Wool Production and Processing (3:10)









Lesson Guide

ACTIVITY 3.1 – Features and Adaptations of Alpacas

Students learn about the features of alpacas and how their structural features and behaviours enable their survival in traditional habitats and their environmental suitability as farmed animals in the cooler regions of Australia.

Display the picture of the alpaca on Worksheet 3.1a – Huacaya and Suri Features
 (Observation activity). Ask students to name the type of animals shown (alpacas).
 Explain to students that there are two different breeds of alpacas, huacaya (pronounced wua'ki'ya) and suri (pronounced soo'ree). Discuss the features the two breeds of alpacas have in common. Students fill in the missing words and record the structural features or characteristics of alpacas on the worksheet.



Discuss the visible differences between huacaya and suri alpacas (type of fleece).
 Distribute Worksheet 3.1b – Suri and Huacaya Fleece (Literacy activity). Students read and highlight important points and then cut and paste the images of huacaya and suri fleece in the correct positions on the worksheet.

Answers 🚱

3. All animals have features that suit them to the environment in which they live. Alpacas originated in temperate climates in high altitude, mountainous areas in South America. Ask students what features the alpaca has that might suit them to living in temperate climates. Temperate climates generally have moderate rainfall spread across the year, sporadic drought, mild to warm summers and cool to cold winters (Science Direct, n.d.).

Answers (%)

- 4. Introduce the concept of an adaptation (a heritable characteristic of an organism that helps it to be successfully suited to the places where it lives, enabling it to survive and reproduce). Distribute Worksheet 3.1c Adaptations (Literacy activity) and using the pictures on page 1 as examples, discuss the meaning of the terms:
 - **Structural adaptation** A physical feature the organism has that helps it survive, e.g. a giraffe's long neck to reach its food source.
 - **Behavioural adaptation** Something an organism does to survive, e.g. penguins huddling in winter to conserve energy and stay warm.

(Activity 3.1 continued following page...)









- 5. View the following videos to show examples of behavioural adaptations of alpacas.
 - Alpaca sounds: the alarm call (1:10)

Alpacas are pack animals that stay together in a group or herd for increased protection from predators. One alpaca keeps a lookout for danger (such as an approaching fox) and warns the others by using vocal calls when the group may be in danger. Young alpacas recognise which vocal calls signal danger and hurry back to the adults and stay in a group. A predator such as a fox is much less likely to attack a group of alpacas than an alpaca on its own.

Alpacas love dust bathing! (0:52)

Alpacas, like many other mammals, roll around in dust or sand. This benefits the alpaca by removing parasites from their skin or fleece. This behaviour is called dust bathing.

6. Students record examples of alpaca structural and behavioural adaptations in the space provided on the worksheet.





7. Conclude by viewing What makes Australia a great home for the Alpaca (1:18)

ACTIVITY 3.2 – Build an Alpaca

Students will produce an accurate, annotated sketch of a life-sized model of an alpaca, either by drawing outside on the concrete or using butchers paper. They will revise the structural features and adaptations of alpacas that make them suited to their environments in Australia.

- 1. Divide students into groups of three to four and distribute Worksheet 3.2a Building a Model Alpaca Datasheet (Modelling activity).
- 2. Nominate an alpaca from the worksheet to each group (Peter, Gunner, Timmy or Tolly).
- 3. Assign groups the task of creating a life-size 2D model of their alpaca. Groups should be allocated an appropriate concrete area (or provided with enough large pieces of butchers paper that can be taped together) to draw a diagram of their allocated alpaca.
- 4. Students follow the instructions and use the provided dimensions on the worksheet to sketch a plan and then create a model of an alpaca to their actual height and length dimensions (if using butchers paper, encourage students to use a lead pencil first to allow them to practise the shape of the animal).

(Activity 3.2 continued following page...)









- 5. When students have completed their model, they should label it with the alpaca's name, sex and age.
- 6. Students recall the structural features and adaptations of alpacas (from Activity 3.1). Each group member labels a structural feature (e.g. short tail) and records one adaptation that makes an alpaca suited to its environment inside the body of the alpaca diagram.

Answers (M

- 7. Students take a photo of the 2D model or hang their butchers paper on display and take a gallery walk around the models of the other groups to observe and compare the size and shape and information for each alpaca.
- 8. Engage in a discussion about the comparative size of different sexes (females are generally smaller than males) and how age impacts the size of alpacas (younger alpacas are generally smaller than older alpacas).

ACTIVITY 3.3 – Supply Chain Flowchart

Students learn about the process of converting alpaca fibre into a product suitable for retail sale. They will sequence each step of the process, creating a flowchart to record the alpaca supply chain.

1. Write the words 'animal fibre' and 'garment/end product' at opposite ends of a central area, such as a whiteboard. As a class, discuss these terms and then draw a long arrow from 'animal fibre' to 'garment/end product'. Brainstorm how the fibre from animals (on farms) is processed or turned into garments or other useful end products for humans to use, and record students' ideas. Encourage students to think about this as a series of steps.

Questions to encourage discussion may include:

- What is animal fibre?
- Why do animals grow fibre?
- How is animal fibre useful to humans?
- What is a 'garment'?
- What things do you and your family wear or use that are made from animal fibre?
- What are the series of steps that take place to turn on-farm fibre products such as alpaca fleece or merino wool into a product suitable for retail sale?

Answers 🙌



(Activity 3.3 continued following page...)





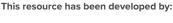




- 2. Explain that alpaca fibre or fleece shares similar properties to sheep wool but with a few important differences. Alpaca fibre does not contain lanolin, the oily substance found in sheep wool that can cause allergies, so alpaca fibre is hypoallergenic. Alpaca fibre has a hollow core which makes it warmer, and has a smoother outer surface, making it less 'prickly' than wool. The steps used to process alpaca fibre into a luxurious end product are similar to those used for sheep wool. Shearing alpacas is a little different than shearing sheep. Sheep are held by hand for shearing. However, alpacas are restrained (tied down) by their legs on a table or the floor as this is the safest way for both the alpacas and the shearer and is standard practice in the alpaca industry.
- 3. Divide students into groups of two or three and distribute butchers paper and markers to each group.
- 4. As a class, view the video <u>Wool Production and Processing</u> (3:10). Watch the video a second time if necessary, and using the butchers paper and markers, students take note of the processes used and the order in which each step occurs.
- View Why Alpaca is the Smart Future for Australia (from 0:0–4:25) to show alpaca shearing, fleece drying (after washing), skirting, top making, spinning and end products.
 N.B. From 4:26, this video shows alpacas being processed for meat. Teachers should evaluate the content before showing students.
- 6. Distribute PIEFA Food and Fibre Card Game | Australian Alpaca Association Supply Chain Game Cards. Students cut out each card using scissors. Explain that students will use these cards to create a flowchart.
- 7. Play card game from the <u>Instructions PIEFA Food and Fibre Card Game | Australian Alpaca Association Supply Chain.</u>

Answers 🚱

8. Optional: Students play Extension 1 – Careers from the <u>Instructions PIEFA Food and</u> Fibre Card Game | Australian Alpaca Association Supply Chain.











Student Resources

ACTIVITY 3.1 – Features and Adaptations of Alpacas

Worksheet 3.1a – Suri and Huacaya Features (Observation activity)

Worksheet 3.1b - Suri and Huacaya Fleece (Literacy activity)

Worksheet 3.1c – Adaptations (Literacy activity)

ACTIVITY 3.2 – Build an Alpaca

Worksheet 3.2a – Building a Model Alpaca Datasheet (Modelling activity)

ACTIVITY 3.3 – Supply Chain Flowchart

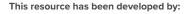
PIEFA Food and Fibre Card Game | Australian Alpaca Association Supply Chain Game Cards

Instructions PIEFA Food and Fibre Card Game | Australian Alpaca Association Supply Chain

Acknowledgments

- Gayle Herring, Fibre Naturally Alpaca Woollen Mill
- Waratah Alpaca Fibre
- Mulberry Park Alpaca Stud
- Coolawarra Storybook Alpaca Stud
- Ambersun Alpaca Stud
- EP Cambridge Alpaca Stud
- Mllduck Alpaca Stud
- Dairy Road Alpaca Stud

- Wedgetail Rise Alpaca Stud
- Barrooka Alpaca Stud
- Precision Alpaca Stud
- Australian Alpaca Association
- Tirrikee Alpaca Stud
- Fleurieu Prime Alpaca
- Malakai Alpaca Stud
- Yaringa Alpaca stud











Answers

ACTIVITY 3.1 – Features and Adaptations of Alpacas

1. Worksheet 3.1a – Suri and Huacaya Features (Observation activity)

Structural features that all alpacas have in common:

- Small head
- Eyes at the sides of their head
- Large to medium sized, pointed ears
- Long, slender neck
- Slender bodies covered in fleece (a type of hair)
- Four long, straight legs
- Two-toed feet with soft pads
- Short tail
- Udders (with four teats)
- They also have a three chambered stomach which is not obvious when looking at them.

2. Differences:

Huacaya have fleece which grows outwards from the body and is thick with a crimp. Suri's have fleece covered with lustrous, silky fibre, highly desired by processors. The fleece hangs in locks from a centre part. Suris' ears can be up to 2cm longer than huacaya ears.

- 3. Hair is critical to the survival of most mammals. The alpaca's hair, its fleece, is fine and light and provides excellent insulation from the cold by preventing the loss of body heat. The hair also reflects the sun's UV rays and protects the alpaca's skin. The fleece keeps them warm in cold, wet and windy conditions and protects them from the sun when hot.
- 6. Worksheet 3.1c Adaptations (Literacy activity)

(Answers to Activity 3.1 continued following page...)









Structural adaptations:

- Body covered in fleece (hair) to maintain body temperature (see answer 3 on previous page).
- Soft feet (no hooves) to prevent damaging vegetation (i.e. their food source).
- Forward facing ears that point upwards to listen for approaching predators or other dangers. They also allow them to hear alarm or warning calls from other alpacas.
 This makes them able to react quickly when danger approaches.
- Eyes at the sides of their head allow them to have a wide field of view to look out for predators.
- Alpacas are tall (long necks and legs). This enables them to see predators coming towards the herd, and they can sound the alarm. The larger grouping of animals is usually enough to scare the predator away, however, alpacas may also chase the predator away.
- Colouring of fleece allows for camouflage in their natural habitat.

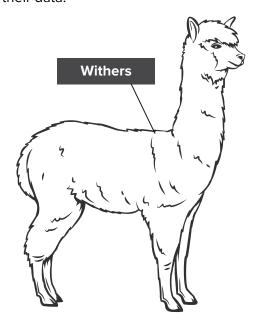
Behavioural adaptations:

- Herding behaviour helps the individual animals in the groups, e.g. when faced with danger, if a predator is sighted, one alpaca can warn all members of the herd and they can group together for protection.
- Vocalisations (alarm calls, mating, etc.) allow communication amongst the herd.

ACTIVITY 3.2 – Build an Alpaca

Worksheet 3.2a – Building a Model Alpaca Datasheet (Modelling activity)

This diagram shows the shape of an alpaca. Note the withers has been marked, which students use in their data.



(Answers to Activity 3.2 continued following page...)









6. Features labelled include:

- Small head
- Eyes at the sides of their head
- Large to medium sized, pointed ears
- Long, slender neck
- Slender body covered in fleece (a type of hair)
- Four long, straight legs
- Two-toed feet with soft pads
- Short tail
- Udders (with four teats)
- They also have a three chambered stomach which is not obvious when looking at them.

Adaptations

Structural adaptations:

- Body covered in fleece (hair) to maintain body temperature (see answer 3 on page 10).
- Soft feet (no hooves) to prevent damaging vegetation (i.e. their food source).
- Forward facing ears that point upwards to listen for approaching predators or other dangers. They also allow them to hear alarm or warning calls from other alpacas.
 This makes them able to react quickly when danger approaches.
- Eyes at the sides of their head allow them to have a wide field of view to look out for predators.
- Alpacas are tall (long necks and legs). This enables them to see predators coming towards the herd, and they can sound the alarm. The larger grouping of animals is usually enough to scare the predator away, however, alpacas may also chase the predator away.
- Colouring of fleece allows for camouflage in their natural habitat.

Behavioural adaptations could also be annotated, such as herding behaviours when faced with danger, e.g. a predator.









ACTIVITY 3.3 – Supply Chain Flowchart

1. What is animal fibre?

Natural fibres grown by certain animals, including hair, fur, wool, fleece, feathers, silk, etc.

Why do animals grow fibre?

To keep themselves protected from their environment. Fibre keeps them warm, cool, and protects them from the rain and wind. Feathers enable birds to fly. Fibre also offers camouflage.

How is animal fibre useful to humans?

- Making clothes, blankets, etc. to keep us warm and comfortable.
- Softens floors (carpets and rugs), etc.

What is a 'garment'?

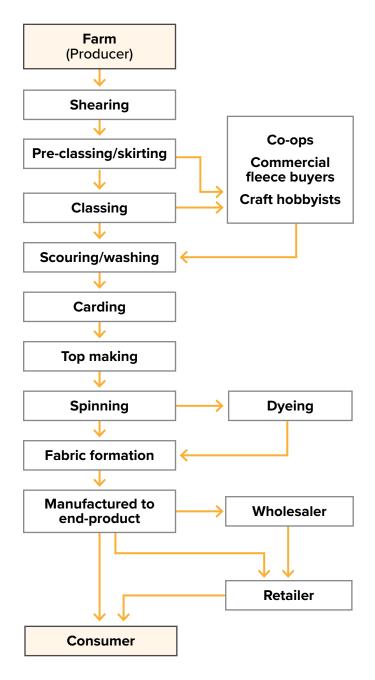
An item of clothing.

What things do you and your family wear or use that are made from animal fibre?

Various responses, including jumpers, socks, scarves, hats, doona/duvet/quilt, carpet, etc.

What are the series of steps that take place to turn on-farm fibre products, such as alpaca fleece or merino wool, into a product suitable for retail sale?

See the flowchart to the right. Students will most likely name only a few of these.











References

- ALPACA BREED STANDARD HUACAYA AND SURI CONFORMATION. (n.d.). Retrieved November 23, 2022, from: https://alpaca.asn.au/wp-content/uploads/2019/09/breed-standards-document-.pdf
- Australian Alpaca Association. (n.d.-a). *Home*. Australian Alpaca Association. https://alpaca.asn.au/
- Australian Alpaca Association. (n.d.-b). What makes Australia a great home for the Alpaca. www.youtube.com. Available at: https://www.youtube.com/watch?v=7Xn0flPE_jk
- Australian Alpaca Organisation. (n.d.). Why Alpaca is the Smart Future for Australia. www.youtube.com/. Retrieved September 14, 2022, from: https://www.youtube.com/ watch?v=quXELeJI7bc
- Campo Verde Alpacas. (17 C.E., October). Alpaca alarm call gets the herd together | Sound on: alpaca alarm call Queenie, our black matriarch alpaca, notices a fox in the paddock and alerts the herd. Notice how the little ones run... | By Campo Verde Alpacas | Facebook. www.facebook.com. https://www.facebook.com/watch/?v=1003033750179813
- Campo Verde Alpacas. (28 C.E., August). Girl time dust bathing in the sun | Girl time. Alpacas love dust bathing and nothing better than doing it on a sunny day with your besties. Didi, Divina, Delicia and Dorada take... | By Campo Verde Alpacas | Facebook. www.facebook.com. https://www.facebook.com/watch/?v=239237958111789
- Holt, C. (2014). CLASSING ALPACA FIBRE CLASSING OF ALPACA FIBRE. https://www.bas-uk.com/wp-content/uploads/2021/06/2014-guide-to-CLASSING-OF-ALPACA-FIBRE-general-public-SS.pdf
- IWTOCHANNEL. (n.d.). Wool Production and Processing. www.youtube.com. Retrieved November 23, 2022, from: https://www.youtube.com/watch?v=ezcnihYoJ7E&t=189s
- Science Direct. (n.d.). Temperate Climate an overview | ScienceDirect Topics.

 www.sciencedirect.com. https://www.sciencedirect.com/topics/earth-and-planetary-sciences/
 temperate-climate#:":text=Temperate%20climates%20are%20generally%20defined
- Campo Verde Alpacas. (2023a, March). *Alpaca sounds: the alarm call.* www.youtube.com. https://www.youtube.com/watch?v=zM1zRnGO4XY
- Campo Verde Alpacas. (2023b, March). *Alpacas love dust bathing!* www.youtube.com. https://www.youtube.com/watch?v=yksU1c8ckYg









OBSERVATION ACTIVITY

Suri and Huacaya **Features**

Fill in the blank spaces below:

1.	There are two breeds of		. •
	They are called	and	





Observe the two pictures above and answer the following questions.

- Describe the structural features that all alpacas have in common:
 - a) Head:
 - b) Eyes:
 - c) Ears: _____
 - d) Neck:
 - e) Body covering: _____
 - f) Legs:









Suri and Huacaya Fleece

There are two distinct breeds of alpaca – **huacaya** and **suri**. The key difference between them is observed in their fleece characteristics.

Read the information below and cut out the two pictures of alpaca fleece or fibre and match each picture with the breed of alpaca it corresponds to.

1. **Huacaya**, (pronounced *wua'ki'ya*), is the most common alpaca breed in South America and Australia. Huacayas have a thick fleece that grows outwards from the body with a crimp.

Label the crimp on the picture.

2. The less common breed is the **suri**, (pronounced *soo'ree*), and in Australia, only a small percentage of alpacas are suri. They have lustrous, silky fleece prized by processors. The fleece hangs in locks from a centre part and has a lustre and a more slippery and silky feel than the huacaya. The predominant suri colours are white or light fawn.













Adaptations

Adaptations are the heritable characteristics living things have that help them survive and reproduce in their environment.

The growth and survival of living things are affected by the environment. Think about how these adaptations are helpful to these living things.

Structural adaptation



1. Giraffes have long necks to reach leaves on trees.

Behavioural adaptation



2. Penguins huddle together in winter to conserve energy and stay warm.

Record your definition of	Γ
structural adaptation:	

Record your definition of **behavioural adaptation**:









Adaptations (cont.)

Alpacas have structural and behavioural adaptations that help them survive and reproduce in the places where they live. Alpacas live in temperate climates with moderate rainfall spread across the year, occasional drought, mild to warm summers and cool to cold winters.

In Australia, the decision to farm a particular type of animal (such as alpacas, pigs or goats, for example) is centred around ensuring that the animal breed is suited to the farm's environment. A producer considers the climate (rainfall, temperature, wind, etc.) and whether the animal breed has adaptations that will enable it to survive and be productive. The producer will also look at other factors to decide if they wish to farm a particular animal. Alpacas are suited to temperate areas in all states of Australia.

List the alpacas' structural and behavioural adaptations for living in a temperate climate. State the feature and describe how the feature benefits the alpaca in its environment.

Structural adaptations

1.	Feature:
	How the feature benefits the alpaca in its environment:
2.	Feature:
	How the feature benefits the alpaca in its environment:



primezone





Adaptations (cont.)

Behavioural adaptations

1.	Behaviour:
	How the behaviour benefits the alpaca in its environment:
2.	Behaviour:
	How the behaviour benefits the alpaca in its environment:











MODELLING ACTIVITY

Building a Model Alpaca Datasheet

Collect the following materials:

Option 1

- Multiple pieces of butchers paper
- Sticky tape
- Marker pens, lead pencil
- Meter rulers/ tape measure

Option 2

- Cement/asphalt area
- Chalk
- Lead pencil
- Meter rulers/ tape measure

Activity instructions:

- 1. Your teacher will nominate an alpaca to your group. All alpacas are huacayas. Underline or highlight your group's alpacas name on the table.
- 2. Use the data in the table to study the dimensions of your animal.
- 3. Draw a plan of the alpaca your group will draw on the graph paper below the table. Include the measurements in your plan.
- In an appropriate concreted area or on butchers paper, use a ruler to roughly mark the dimensions of your animal.
- 5. With your group, draw an outline of your alpaca and use your plan and the data to model the shape and any features you notice about the animal. Label your diagram with its name, sex and age.
- 6. Recall the structural features and adaptations that alpacas have and allow each group member to label a feature (e.g. short tail) and record one adaptation that makes an alpaca suited to its environment inside the body of the alpaca diagram.
- Take a photo of your animal (if you have drawn it on cement) or hang your butchers paper on display.
- 8. Take a gallery walk around the models of the other groups to observe and compare the similarities and differences in size and shape, and other information for each alpaca.









MODELLING ACTIVITY

Building a Model Alpaca Datasheet (cont.)

Data for model alpacas:

Alpaca name	Sex	Age (years)	Length from head to foot (cm)	Length of leg (cm)	Length from wither* to tail (cm)
Peter	Male	3	133	78	84
Gunner	Male	3	119	77	77
Timmy	Male	0.5	115	70	69
Molly	Female	0.5	102	61	57

^{*}Note: The wither is at the top of the shoulders of the front legs.

Huacaya alpacas:



A young alpaca is a **weaner** from 6 to 12 months old.



An adult female is a **hembra** from 12–18 months onwards and an adult male is a **macho** from the age of 24 months (2 years old).











MODELLING ACTIVITY

Building a Model Alpaca Datasheet (cont.)

Plan for model alpaca:

