

LITERACY ACTIVITY

Alpacas

Alpacas are members of the family that includes the guanaco ('hwan-ark-oh'), llama ('ya-mah' or 'lar-mah') and vicuna ('vy-koon-yah'). Collectively, they are known as South American Camelids. Alpacas are a variation from the original vicunas that lived more than 7,000 years ago.

Alpacas originate from South America and were highly valued animals during the Incan civilisation from the 13th until the 16th century. They were an essential component in the provision of food and clothing (fleece and leather), and their manure was burnt as a source of fuel for heating and cooking. During this time, alpacas were found in various regions of South America, and alpaca numbers approached 50 million.

During the Spanish invasion in the 16th century, the majority of alpacas were slaughtered and almost extinguished. The remaining alpaca farmers, known as alpaqueros, retreated to the high mountain regions (the Andes) where the newly introduced cattle and sheep could not survive. It was only their resilience and tolerance of harsh climates that saw alpacas continued existence in the Andes.



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LITERACY ACTIVITY

Alpacas (cont.)

Their value was reestablished and again utilised during the 1800s. In the 1850s, the entrepreneur Charles Ledger imported the first alpacas to Australia.



The venture was not a success and the herd of alpacas was dispersed and eventually died out. Alpacas were first imported into the United States of America and Canada in 1984, and then to Australia (for the second time) and New Zealand in 1988. These countries offer milder climates and, most importantly, the opportunity to apply more advanced farming techniques and better management, which have seen herd numbers prosper in a relatively short timeframe.

Alpaca fibre has many uses and these depend on the class line of the fibre. The most obvious uses are clothing, including items that are knitted or woven out of fibre, such as gloves, scarves and high-end suits. Alpaca fibre has been used to make household items, such as doonas, blankets, bed underlays and carpet. It can be used to fill pillows or dog beds and as wadding in various types of jackets. Less common uses of alpaca fibre include mask filters (see 'fair air fire mask' link) and insulation for homes or sheds.

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DICHOTOMUS KEY ACTIVITY

Classification of Alpacas



A camel has a humped back, a short tail, long slim legs, and a long neck. It has two large toes that spread apart to keep the animal from sinking into the sand. There are two types of camel, the dromedary and the bactrian.

Average height to shoulder: 180cm



A llama is approximately twice the size (from feet to head) of an alpaca with banana-shaped ears. They do not have humps. They have long legs and necks, short tails, small elongated heads, and large pointed ears. Their fleece is more coarse than an alpaca.

Average height to shoulder: 120cm



An alpaca is a slender-bodied animal with a long neck, long legs, a short tail, a small blunt-shaped head, and large triangular, fleece-covered, pointed ears. Alpacas are used for their fleece, meat and as pets or herd guards. The Australian Alpaca Association recognises 16 different colour variations of fleece.

Average height to shoulder: 95cm



The guanaco lives in small bands (groups) of females led by a male. Both males and females are pale brown above, white on their undersides and have greyish heads. The guanaco is double coated, and its undercoat can be much finer than an alpaca, but is not as fine as that of a vicuna. The pelts are often used by the fur industry.

Average height to shoulder: 110cm



A vicuna is the smallest member of the camel family. It is covered with long, fine, soft fleece. The colour of the fleece varies from light cinnamon to pale white, with long white fleece hanging from the lower flanks and the base of the neck. The fleece produced is valued for its rarity, and it is one of the finest and most valuable fibres in the world.

Average height to shoulder: 90cm

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DICHOTOMUS KEY ACTIVITY

Classification of Alpacas (cont.)

In the space below create a dichotomus key to identify a camel, llama, alpaca, guanaco and vicuna. Cut out the pictures on page 1 and paste them in the correct locations on your key.

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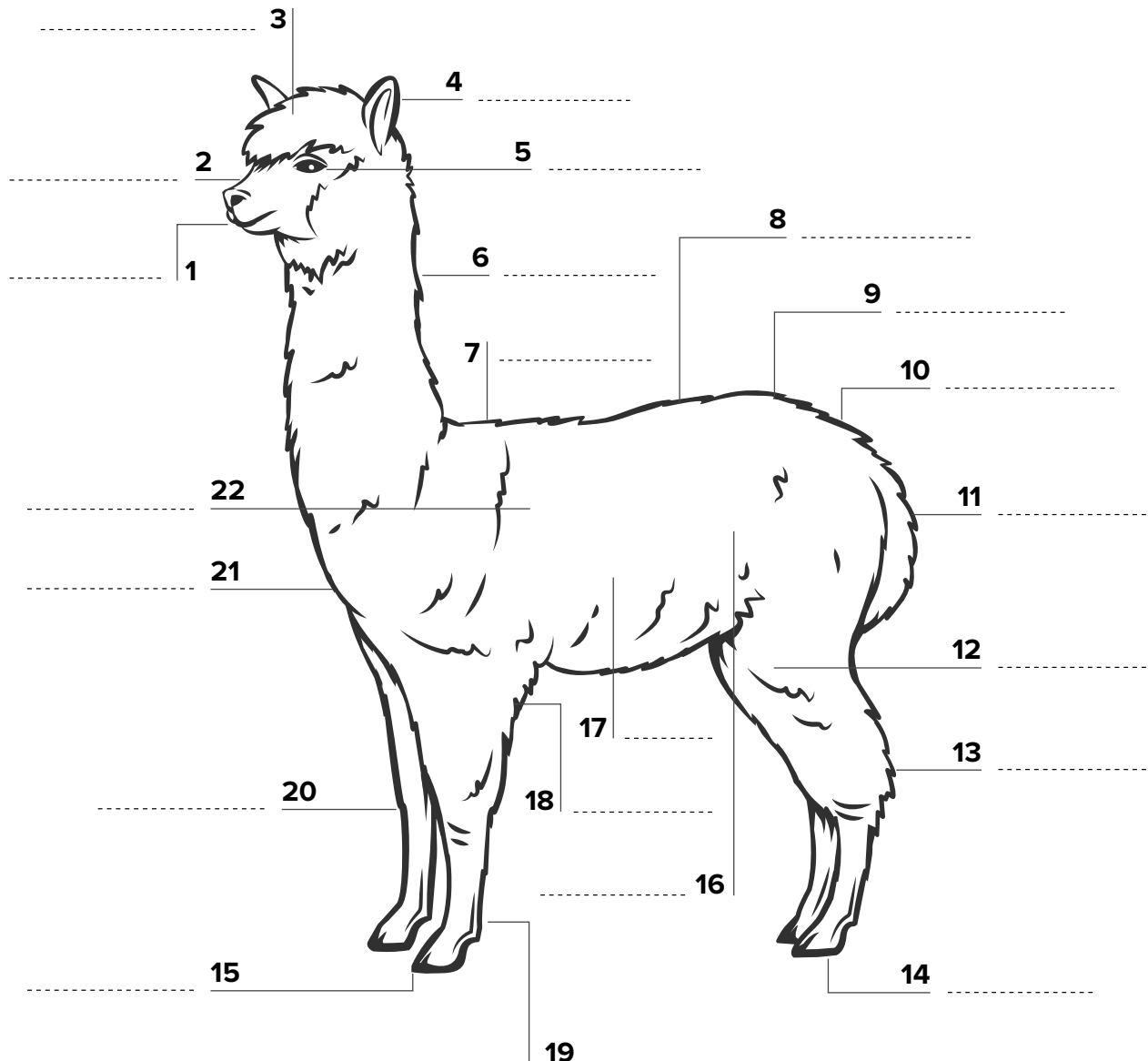


LABELLING ACTIVITY

Alpaca Anatomy

Label the features of the alpaca by writing the name beside the correct number. Use the word bank below to help identify the parts.

- Toenail
- Pastern
- Mouth
- Back
- Thigh
- Croup
- Ribs
- Muzzle
- Rump
- Shoulder
- Tail
- Eyes
- Ears
- Withers
- Elbow
- Apron/bib/chest
- Knee
- Neck
- Bonnet/bob
- Hock
- Pad
- Flank



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LITERACY ACTIVITY

Huacaya and Suri

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

Huacaya, (pronounced wua'ki'ya), is the most common alpaca type in both South America and Australia. The huacaya has soft fibre and boasts a well covered bonnet of fibre that extends to its forehead and cheeks, while its dense body fibre grows directly outwards, not unlike merino fleece.

The fleece on the neck and legs is often shorter than the fleece on the saddle which is even across the body. The huacaya grows fleece which is crimped. In general the crimp indicates the quality of the fibre.

The less common type is the **suri**, (pronounced soo'ree), and in Australia, only a small percentage of alpacas are suris. The animal is covered with lustrous, silky, locking fibre, prized both in the show ring and by consumers. The fleece hangs from a centre part – neck through to tail – with the locks lying close to the skin in a draped, free-swinging curtain. The fleece has lustre, and its feel is more slippery and silky than that of the huacaya. The suri, like the huacaya comes in 22 natural colours.



Huacaya



Suri

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LITERACY ACTIVITY

Huacaya and Suri (cont.)

Huacaya



Huacaya fleece



Huacaya fleece is often described as ‘sheep wool-like’ because of its crimping bundles and the way the fleece grows out from the animal’s body in an aligned, organised mass. Huacaya fibre crimp characteristics are variable and dictate the end use of the fibre, i.e. very high frequency crimp styles in fine or medium micron fibre make ideal yarn for knitted products, whilst low frequency crimp styles with longer intervals in higher micron fibre are better suited to use in carpets.

The ideal huacaya alpaca has a uniform fibre with consistent colour, length, strength and crimp style. It is consistently bright and fine, with little guard hair.

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LITERACY ACTIVITY

Huacaya and Suri (cont.)

Suri



Suri fleece



Suri alpacas grow fleece which hangs in locks across the body. These can be of a flat or twisted style. An ideal suri grows fleece that locks in a consistently flat style that remains organised and is silky to the feel.

In Australia, alpacas are also used for:

- **Meat production** – a low-fat, high-protein option
- **Herd guards** – placed in the same paddocks as sheep and goats to reduce predation by foxes
- **Pets** – a low maintenance animal, with minimal environmental impact

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GRAPHIC ORGANISER ACTIVITY

Huacaya and Suri

Organise your information using the headings below.

Topic: A comparison of two types of alpacas (animal and fleece).

Similarities	Differences

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COMPREHENSION ACTIVITY

The Digestive System

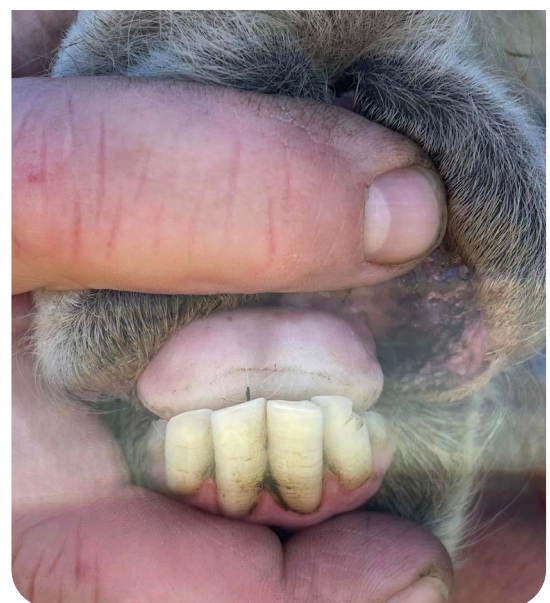
Alpacas and other camelids are **pseudo ruminants**. This means that instead of having four stomach compartments (like cattle, sheep and goats) they have three.

Ruminants rely on populations of **microbes** in their stomach to help digest the plant material they eat. If an alpaca looks like it is chewing for an extended period of time it is probably chewing its cud, which is when food that has been chewed and swallowed once, is then regurgitated back into the animal's mouth for a second go!

Alpacas can move the two sides of their **top lip** separately and do not use their tongue to rip pasture as cattle do. They have **teeth** on the bottom of their mouth and a bony **pad** on the top.

The **oesophagus** is a muscular tube which takes food from the mouth to the ruminant stomach.

The three forestomach compartments include the **C1**, **C2** and **C3**. The C1 and C2 consist of large populations of microbes that help to digest plant material. The C1 is like a big fermentation vat. The food is then ruminated (taken back to the mouth) for rechewing, so that the teeth can further break down the food into even smaller particles (and increase its surface area for more microbial action in the chambers). This process means that alpacas are able to obtain more nutritional value from the food they eat. Alpacas produce 'burps' to move gas out of the stomach (that is produced by the microbes). The glandular sacculles (C1) function to absorb nutrients and also release buffering chemicals to promote a desirable environment for microbial populations.



This resource has been developed by:

COMPREHENSION ACTIVITY

The Digestive System (cont.)

The final section of the alpaca's **C3 stomach** is often referred to as the true stomach and functions as a non-ruminant stomach does: using enzymes, acids and muscular activity to digest food.

The **small intestine** is the structure that is responsible for further digestion and absorption of nutrients. The **large intestine** is predominately used to absorb water (and nutrients), and undigested food that then passes along the **spiral colon** (where the pelleted faeces begin to form) and are then egested from the **rectum**.

Alpacas usually use a communal dung pile for defecation and urination and generally avoid grazing near these areas.



Did You Know?

Cria's (baby alpacas) are born with underdeveloped C1 and C2's. Milk is the main nutrition for the first weeks of life and it bypasses the C1.

By 12 weeks of age, an alpaca's C1 will have developed and have the same amount of microbial activity as an adult. A mother will lick the cria's tongue to pass on microbes!



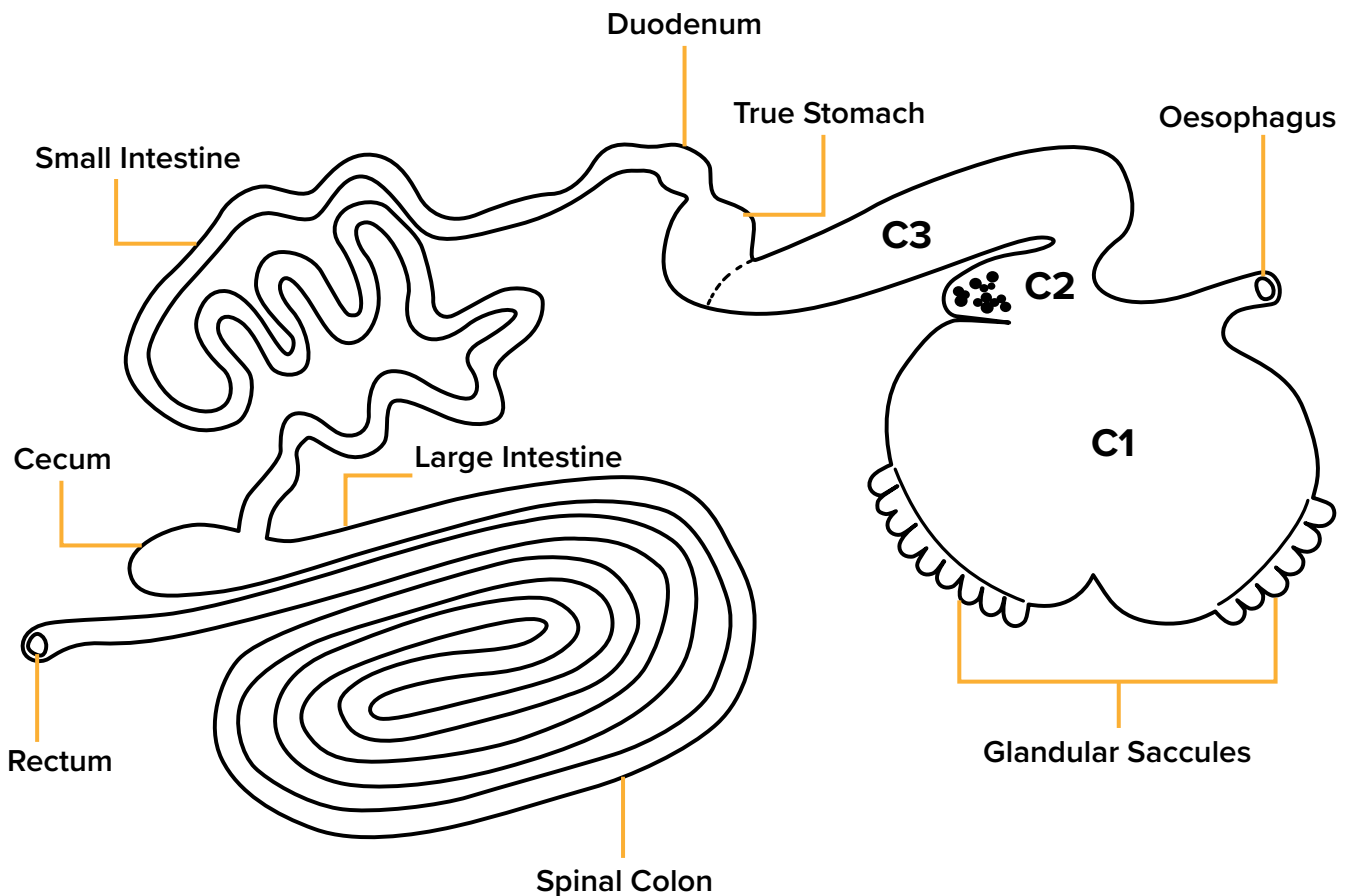
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COLOUR CODING ACTIVITY

The Digestive System

Colour code each of the parts of the alpaca's digestive system using the colours below.

- Oesophagus – green
- C1 – dark blue
- Glandular Sacculles – dark green
- C2 – purple
- C3 – yellow
- True stomach – pink
- Duodenum – dark red
- Small Intestine – orange
- Cecum – black
- Large Intestine – light blue
- Spiral Colon – grey
- Rectum – brown



This resource has been developed by:

COLOUR CODING ACTIVITY

The Digestive System (cont.)

Record a brief summary of the function of each of the structures in the table below.

Structure	Function
Mouth and Oesophagus	<hr/> <hr/> <hr/>
C1 (and Glandular Saccules) C2 C3 True Stomach	<hr/> <hr/> <hr/>
Small Intestine	<hr/> <hr/> <hr/>
Large Intestine Spiral Colon	<hr/> <hr/> <hr/>
Rectum	<hr/> <hr/> <hr/>

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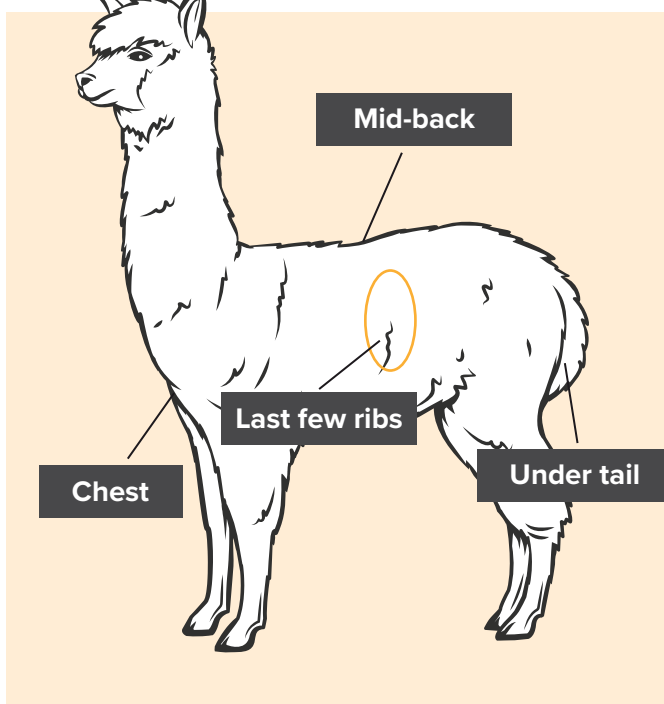
QUESTION AND ANSWER ACTIVITY

Nutrition and Alpacas

Alpacas rely on nutrition for their health and productivity. Read the information and answer the questions about nutrition and alpacas.

- Energy is needed to fuel the body's needs, and if lacking, will result in poor health for the animal and poor economic returns for the producer.
- The amount of nutrition an animal needs will depend on its age, sex (male or female), pregnancy or whether it is lactating (feeding offspring milk). If pasture is not sufficient in meeting the needs of animals, supplementary (additional) feeding is required.
- Just like humans, alpacas require protein (the building block for muscle and important for growing and lactating animals), fibre (essential for the forestomach to function properly), vitamins (e.g. C and B), minerals (e.g. potassium and calcium) and water to grow and develop.
- Producers can check the condition of their animals quickly to make sure they are the desired weight (not too thin and not too overweight). Nutrition can affect the quality of the fleece produced by an alpaca (e.g. the fibre diameter).

Body condition scoring



- The most used area is over the central backbone near the last ribs.
- Do NOT make an assessment over the pelvis as this area often feels bony, even with obese alpacas.
- Place fingers on the centre of the back, either side of the vertebrae feeling for muscle coverage.
- Palpate the area with your fingers and thumb making an appraisal of the muscle mass.
- It should reveal a firm, slightly convex body shape.
- Bulging would indicate an overweight animal, whereas concave tone indicates an underweight condition.

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QUESTION AND ANSWER ACTIVITY

Nutrition and Alpacas (cont.)

Paddock Feed

- Alpacas are primarily grazers and eat small amounts of a wide variety of plants.
- The quantity eaten will vary considerably and is dependent on the digestibility of the pasture (actively growing, green grass/legumes before flowering is the most digestible) and also on the animal's physiological status (lactating females will have a much higher nutritional requirement).
- Alpacas will do well on high-quality native pastures or most introduced species.

Supplementary Feed

- Alpacas should ideally be pasture fed at all times.
- Depending on location, paddock feed may not be adequate throughout the year, particularly for those with higher protein or energy requirements. Pregnant and lactating females, plus growing cria and weaners, need a higher quality daily intake than dry adult alpacas.
- When the quality or quantity of pasture is limited, alpacas may be supplemented with good quality lucerne or clover hay and/or high energy or protein feeds, such as cracked lupins, according to their physiological state (e.g. pregnancy, lactation, growth, maintenance).
- Alpacas can also be supplemented using a commercial mix or pellets designed for alpacas.



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QUESTION AND ANSWER ACTIVITY

Nutrition and Alpacas (cont.)

Vitamin and Mineral Supplements

- Alpacas have a daily requirement for a wide range of minerals and vitamins, most of which will be met if the animal has access to good pasture and some supplementary feed or mineral mix.
- Vitamins B and C are readily available from microbes living in the forestomach, so an animal with a well-functioning digestive system should not require supplements.
- Vitamin A and E should be readily available in the pasture, but at times, it may be necessary to supplement these.
- Vitamin D is essential for bone development and metabolism. Alpacas have higher vitamin D requirements than ruminants, possibly due to them being adapted to very high UV exposure in their native environment. Vitamin D requirements are especially high for young growing animals, animals with darker skin or heavy coats (blocking UV light), and animals not sufficiently exposed to UV light (i.e. south of latitude 34°S during wintertime in Australia).
- Vitamin D deficiency in growing animals leads to a bone condition called rickets.
- Vitamin D is generally available in an injectable form, containing vitamins A, D and E.
- Cria should receive injectable ADE at around 10 weeks of age. A further dose may be required in mid-winter in southern parts of Australia. Adults (particularly those with dark, dense fleece) should receive one dose in mid-winter in southern areas. As vitamin D can be toxic if administered in excess, new owners are advised to consult their veterinarian to confirm the required dose to be administered.



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QUESTION AND ANSWER ACTIVITY

Nutrition and Alpacas (cont.)

1. Identify a nutritional requirement of an alpaca and describe why it is needed.

2. Explain why the nutritional needs of some alpacas are different to others.

3. Identify why producers do not need to supplement vitamins B and C to their alpacas.

4. Explain why alpacas require higher levels of vitamin D compared to other animals and explain how producers manage this problem in their animals.

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QUESTION AND ANSWER ACTIVITY

Nutrition and Alpacas (cont.)



5. Use the QR code or access the [Australian Alpaca Advice Body Conditions Score pdf](#) to view a pictorial representation of Body Condition Scores from 1 (very thin) to 5 (obese). Copy the diagram into the space below, annotating the range from 1 to 5.

▶ **Australian Alpaca Advice Body Conditions Score:** <https://alpaca.asn.au/wp-content/uploads/2020/07/AAA-Advice-Body-Condition-Score-.pdf>

Question 6:

Using the information from page 2 of the same document, complete the Body Condition Scores for the animals at different physiological states.

Animal	Score	Animal	Score
Wether		Pregnant female	
Non-pregnant mature female		Working male	
Mature male		Growing (<15 months)	

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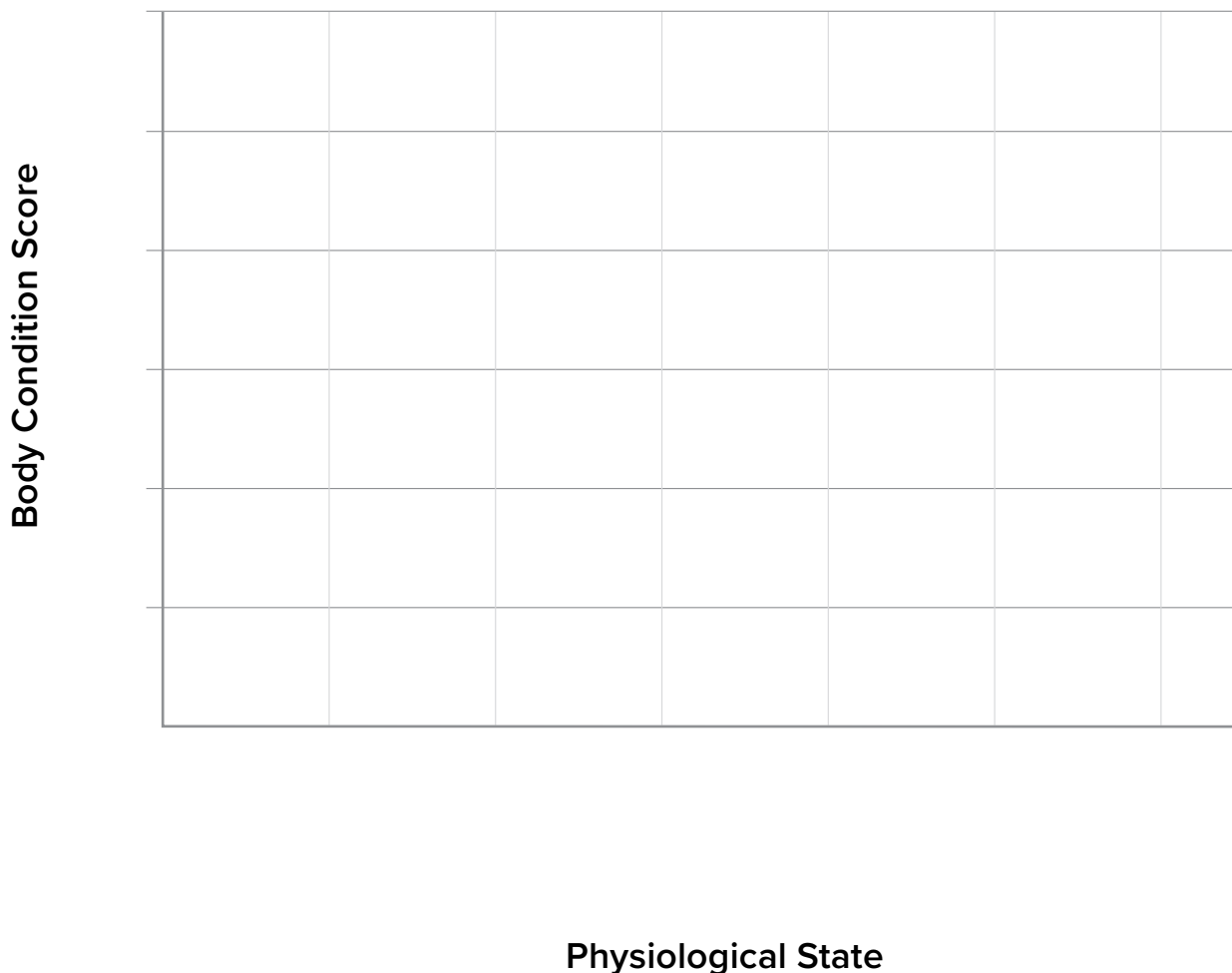
QUESTION AND ANSWER ACTIVITY

Nutrition and Alpacas (cont.)

Question 7:

Represent this information in a graphical form.

Body Condition Score for Alpacas Depending on Physiological State



KEY

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CLASSING ACTIVITY

Assessing Alpaca Fleece

Understanding Fleece Results

Testing and understanding fleece results is important to alpaca breeders and producers. It allows them to make educated and informed decisions about their animals.

Use the QR codes or access the links to watch a suri and/or a huacaya fleece being assessed by a senior judge.

▶ **Huacaya Fleece Judging – Peter Kennedy-Gane:** (13:14) <https://www.youtube.com/watch?v=aBlxgjTaaGw>



0:00 Overview of judging | 2:35 | fleece being assessed {weight, micron, handle, uniformity: fleece, staple, length, colour, style and density of lock, brightness, impurities, effective skirting)

▶ **Suri Fleece Judging – Peter Kennedy-Gane:** (12:26) <https://www.youtube.com/watch?v=3ENO6J9lq2E>



0:00 Overview of judging | 5:22 | fleece being assessed {weight, micron, handle, uniformity: fleece, staple, length, colour, style and density of lock, lustre, impurities, effective skirting)

This resource has been developed by:

CLASSING ACTIVITY

Assessing Alpaca Fleece (cont.)

- **Micron** is the unit of measurement for describing the diameter of the fibre. 1,000 microns = one millimetre. Fibre diameter is the single most important fibre trait with regard to commercial processing. It is also one of the most heritable fibre traits. Low-fibre diameter fleece is the most valuable. A fleece is assessed in the range of:

- **Ultrafine** <18 micron
- **Superfine** 18-20 micron
- **Fine** 21-23 micron
- **Medium** 24-26 micron
- **Strong** 27-30 micron
- **Extra-strong** >30 micron

- **Standard Deviation** (SD) tells you how similar in micron the fibres are across the sample (also referred to as the 'uniformity' of the sample). What the SD is actually telling you is how the micron of the majority of the fibres in the sample are spread either side of the mean. For example, if the Mean Fibre Diameter is 20 μ and the SD is 4 μ , this means that two-thirds (66%) of the fibres in the sample are between 16 μ (4 μ below the mean) and 24 μ (4 μ above the mean). An SD below 4.5 μ is good; even lower will greatly enhance the value of the fibre for the processor.
- **Type** is a reference to suri or huacaya fleece. Huacaya fleece should exhibit a good crimp and a low micron score. Suri fibre should feel silky, and slippery and appear to have a lustre. The fibre will be organised into locks with a low micron score.
- **Colour** can range from white to black with many shades in between. The Australian Alpaca Association recognises a total of sixteen colours. The lines include:

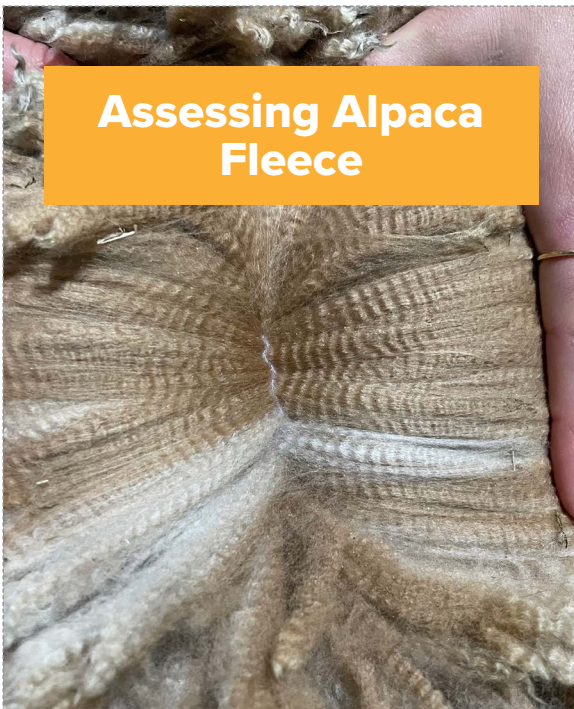
- **White** (WT) – white or off white with no contaminating colour
- **Light Fawn** (LF) – light fawn and white/off white with odd fawn/brown fibres
Fawn (FN) – medium fawn
- **Brown** (BR) – dark fawn, light/medium/dark brown
- **Rose Grey** (RG) – light/medium/dark rose grey
- **Grey** (GY) – light/medium/dark grey
- **Black** (BK) – brown/blue black

This resource has been developed by:

BOOKLET ACTIVITY

Assessing Alpaca Fleece

Use scissors to neatly cut around the individual cards below. Place them in order on top of each other and staple the pages into a 'mini booklet'. Fill in the page numbers on the contents page.



Assessing Alpaca Fleece

Contents

- Overview of assessing
- Fibre Diameter (FD)
- Uniformity FD
- Uniformity – colour
- Brightness/Lustre
- Impurities

Overview of assessing

Fibre Diameter (FD)

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BOOKLET ACTIVITY

Assessing Alpaca Fleece (cont.)



Uniformity – FD	Uniformity – Colour
Brightness/Lustre	Impurities

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