



IN THIS ISSUE

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- Why Do Camelids Roll?
- Some Do's & Don'ts
- Starting With Alpacas
- Flystrike In Alpacas
- Careers In Farming

CAMELID CONNECTIONS

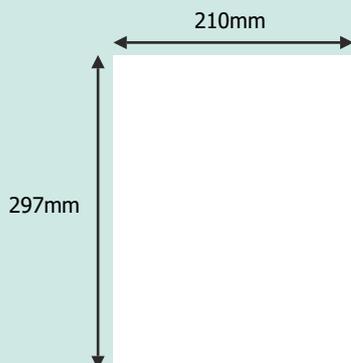
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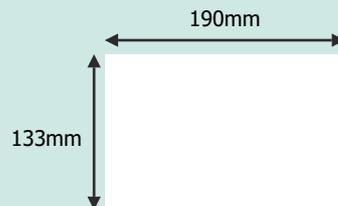
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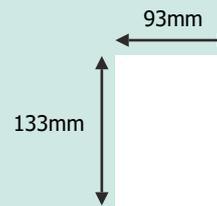
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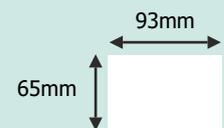
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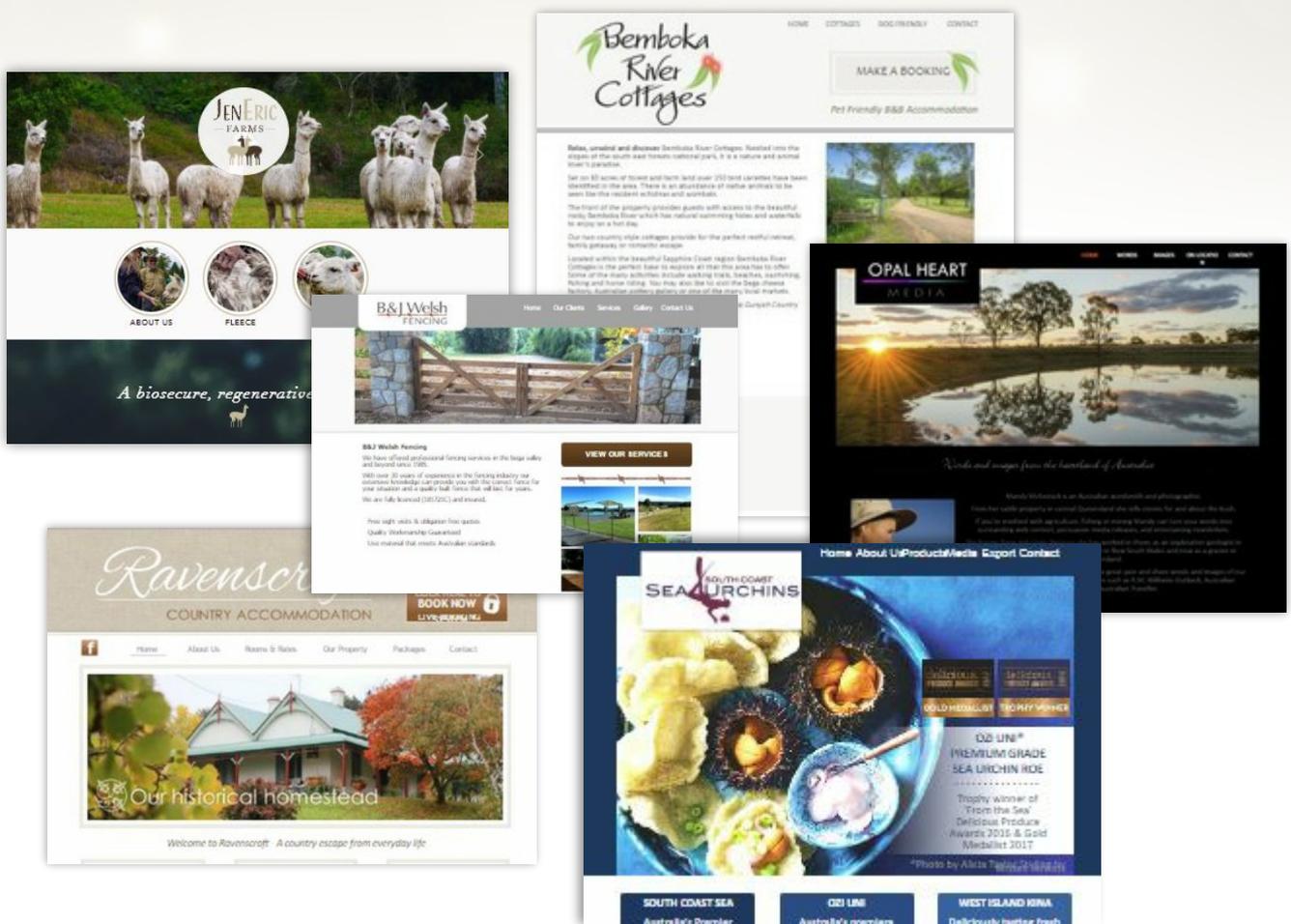
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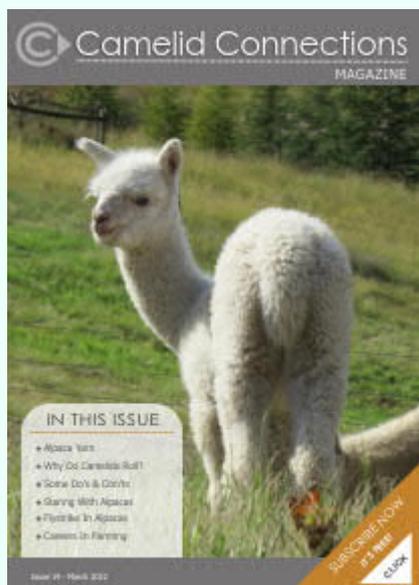
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Cover Image: Cria 'Quintessence' owned by Oak Grove Alpacas

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Welcome to Camelid Connections

In our January issue I remember hoping that 2022 was an improvement on the last two years!

Many readers on the east coast of Australia will be wondering what they did to deserve the incredible deluge of rain that has fallen flooding wide areas around the country. Our thoughts are with those whose properties, homes and livestock have been damaged or lost and our thanks to state emergency, volunteers, family and friends who are helping them get back on their feet.

This issue covers a wide range of stories from articles for those just starting out in alpacas to experienced breeders who may be interested particularly in the research into Gut Parasitism & Premature Births. (see Page 38) This research was done by Lynn Edens from Snowmass Alpacas in the USA, and no matter whether you are a large or small breeder the results are well worth looking at.

A timely reminder on what to look out for with all this wet weather is the Flystrike in Alpacas article on page 30. The images are necessarily graphic, but will help you identify flystrike and explain the damage flystrike can do your alpacas.

Lynn has also written an interesting article about mixing alpaca and cotton which is interesting from a marketing perspective. For those just starting out in alpacas "Starting With Alpacas", "Some Do's & Don't's" and Why Do Camelids Roll" may be of particular interest.

Many thanks to our advertisers who help to keep this magazine going.

This magazine is well read around the country and we would love to help you publicise the alpacas and alpaca products you have for sale. Remember that all our magazines are permanently available in our library and the first magazine we published has now had over 8,000 reads. All adverts have a live link to your website or email address so prospective new customers can contact you at any time.

Meet The Team



Esme Graham - Editor

My husband and I have bred suri alpacas for over 20 years, I was heavily involved with both regional committees and the national board of the Australian Alpaca Association for a number of years and had the honour of being selected as a life member of the Association.

My major interest has been in marketing and education and to this end I was editor of Alpacas Australia magazine for six years and I hope that the experience I gained editing that publication can be extended to educate and inform a wider range of alpaca and llama breeders who are not necessarily association members but have a love of all things camelid.



Julie McClen - Designer/Editor

A breeder of ultrafine Huacaya alpacas for over 20 years at Oak Grove Alpacas, I have a passion for fine fibre and the genetic connection to the most diminutive and finest of the camelids - the wild Vicuna.

I strongly believe that education in any industry is the key to success, so with Camelid Connections we hope to provide interesting and informative articles to assist all camelid owners in getting the most out of their animals and businesses.

I also own Oak Grove Graphics a web and graphic design agency which is producing this magazine, and also allows me to connect with many different people in the camelid related world through my design and web work.

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SOME DO'S AND DON'TS

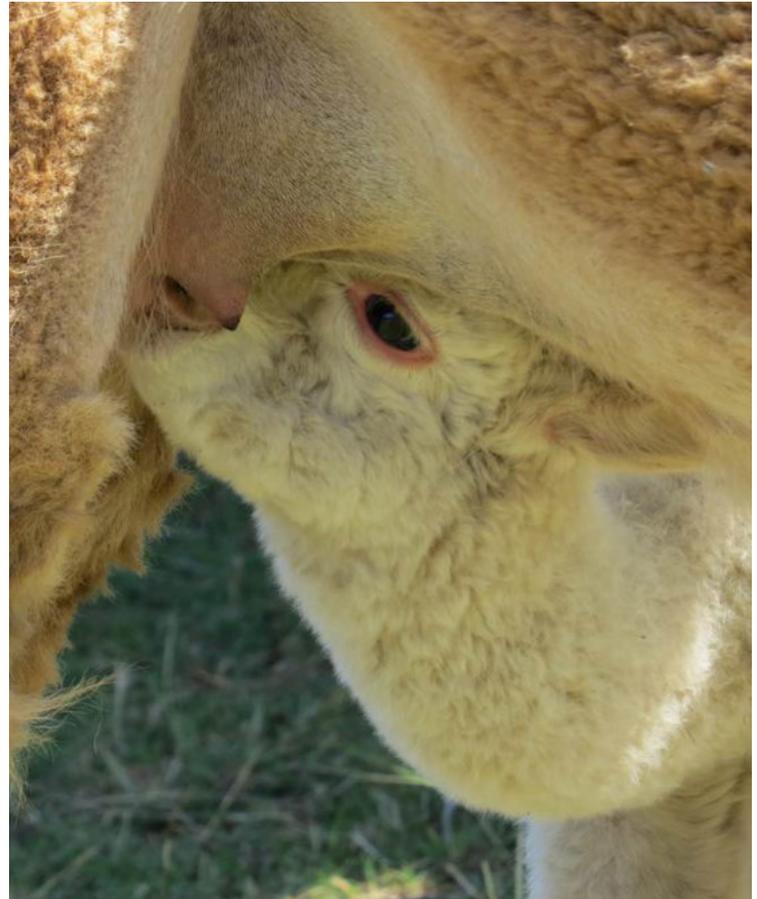
FOR NEW (AND NOT SO NEW) BREEDERS

By Rosemary Eva - Longueville Park Alpacas, Palmvale NSW

Here are a few little hints that may be of use to help you with some “tricks of the trade”.

DON'T brush or comb your alpacas as it destroys the character of the fibre as well splitting the hairs/fibres. If the alpaca needs vegetable matter to be removed do so by brushing with your hand: some may say to use a “flicker” but use with care as overuse may also destroy the character of the fleece.

DO pull the fleece apart when removing vegetable matter for dispatch to a processor. This should help reduce the cost of processing as well as providing a better outcome in the final product. **DON'T** undertake this for showing purposes, rather, lay the saddle on a wire mesh table whereby dust can fall out and vegetable matter can be removed by hand or tweezers. Maintain an intact saddle – clean fleeces gain points and ribbons.



DON'T let the sun set on an alpaca in labour – there may well be a problem. Bring her close to the house into a shed. Assess her progress and if not advancing seek veterinary assistance – this may well save the life of a dam and a cria! Remember, alpacas are not dissimilar to horses and can be easily spooked at night and thus difficult to move.

DON'T remove the wax from the dam's teats- that is the first lesson in the chapter of life for the newborn cria

DON'T leave alpacas with hypothermia in an open paddock; they need to be sheltered from the wind and the rain. Bring them in to a shed, if unable to maintain the “cush” position pack bales of straw/ hay/ cane mulch either side to maintain that position and cover with hessian bags and/or rugs. If wet, hair driers are an effective way of drying them and getting them warm. Check their temperature (rectally) regularly – normal core temperature is 38 degrees. Alpacas can be very susceptible post shearing.



DON'T leave alpacas without adequate shade and water on hot and humid days...

DON'T put small herds into paddocks of several acres. It is a far better practice to subdivide into smaller paddocks with laneways for example, quarter acre and rotate stock. This not only minimizes over grazing but also assist in parasite control. Furthermore, smaller paddocks make it far easier to handle your animals and reduces the risk of vulnerability to predators.

DON'T treat your alpacas for worms on a regular basis. DO collect random faecal samples directly from the individual animal and have tested by your Vet. or a recognized laboratory and then treat accordingly.

Bear in mind the more we give medication for parasite control without adequate identification the greater the risk of resistance.

Also be mindful that:

- a. a certain number of worms are OK;
- b. you are aware of the life cycle of worms;
- c. certain medications can be lethal to alpacas.

DON'T leave alpacas without adequate shade and water on hot and humid days (or any time for that matter!) They can develop hyperthermia very quickly and urgent attention is required. Get them under shelter and gently hose their bellies, cover with wet towels and encourage them to drink – if necessary, use a 50ml syringe to get fluids into them. They will really appreciate soaker hoses or sprinklers in their paddocks to soak their bellies.

DON'T put newly acquired alpacas in with your existing herd. DO put them in a designated (quarantine) area and drench with an appropriate product and leave for ten days; take a faecal sample and ensure it is clear before putting with the existing herd. This is a good biosecurity measure and good farm practice!

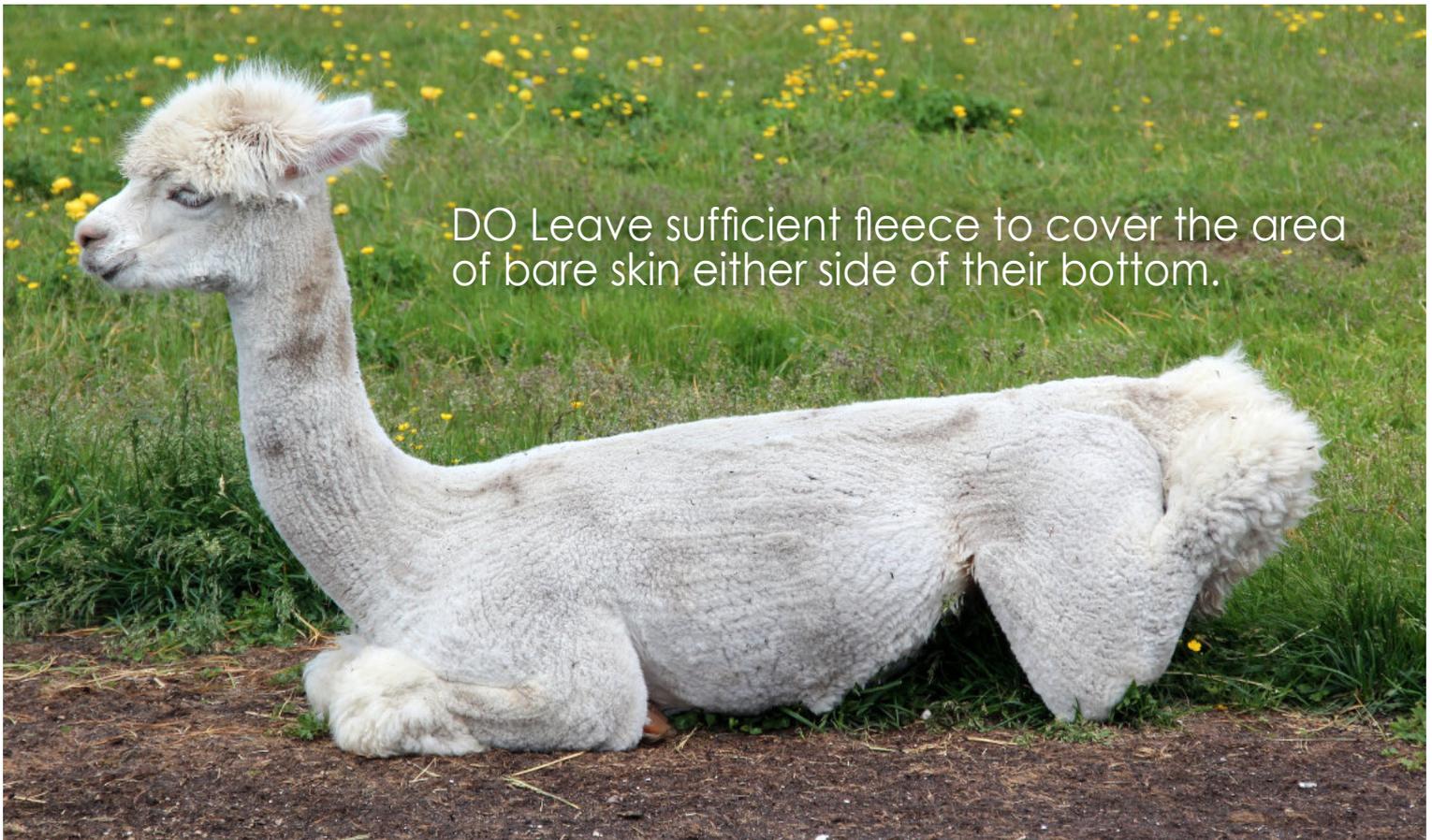
DON'T rely on memory when administering medication/ treatment/ matings etc. DO keep accurate records of all activities and this will prove invaluable over time.

DON'T allow your alpacas to graze in your garden as many garden plants/shrubs can be lethal. DO consult the AAA publication "Poisonous Plants" by Elizabeth Paul.



DON'T shear off the tail or bonnet as alpacas can easily get sunburnt.

DO ENJOY THESE ANIMALS AND DON'T DESPAIR WHEN SOME THINGS MAY NOT GO RIGHT – THERE IS ALWAYS SOMEONE AVAILABLE TO HELP YOU OUT!!



DO Leave sufficient fleece to cover the area of bare skin either side of their bottom.

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COMING SOON NEW FIBRE PROCESSING FACILITY POCKET FARM FIBRE MILL

In the first half of 2022 a new fibre mill is set to open in Southwest Queensland. This will be the first commercial scale mill installed primarily for alpaca fibre in Queensland, and the first commercial scale mill in Australia that has reasonable capacity dedicated to servicing the alpaca industry.

This mill can fully process your raw fibre to yarn and can supply additional services including knitted products and carpets. Each stage of finished processing will be available to customers who want their fibre returned as finished or semi- finished products or just sell fibre to the mill.

The mill will purchase raw fibre, or process fibre to semi-finished products, yarn, or retail products such as knitted wear and carpets/rugs. With the initial installation able to process around 8 - 10 tonnes per annum on a single shift, it is not just another mini mill installation. The installation will still be able to process smaller quantities including individual colours due to having multiple size lines for processing.

Our business is family owned, and we believe in bringing back manufacturing to Australia, not sending fibre offshore for processing. We are happy to receive email enquiries, request for information, offers to sell fibre, etc.

Whilst we are now purchasing fibre for processing, we will not be processing on a subcontract basis until we are happy with our production facility operation but expect to be able to provide this service prior to April 2022.

Pocket Farm Enterprises Pty. Ltd. Contact: info@pocketfarm.com.au

Alpaca Yarn

By Louise Wood - Teeanelle Alpacas



Our journey into the world of alpaca yarn (and textiles) began when we purchased our beautiful small acreage in the hinterland of the Bega Valley in NSW and set up Teeanelle Alpaca Farm. Our small business, Teeanelle - Fibre Yarn Textiles, began as an answer to the question on every small scale alpaca farmer's mind:- 'What do I do with my fleece?'

The fleeces our alpacas somewhat begrudgingly relinquish - after 12 months of care - were far more valuable to us than the return for their sale to commercial fleece buyers, so the decision was made to value add, and sell fibre, yarn (both handspun and milled off farm) and handcrafted textiles, direct at local markets and online. At our scale of production, milled yarn costs far more to produce than it can be sold for, so our milled yarn is used in handcrafting textiles.

Markets are an extremely engaging environment and customers are so interested to hear the story behind the yarn used in each textile item, including the alpaca and the fleece details - that I include on swing tags shown below.

Given the small scale of our farm, the time involved in hand spinning and milling delays (21months in one instance!), demand soon outstripped our ability to supply yarn from our own farm. So we ventured into handcrafting textiles using commercial alpaca yarn. Items made with our own yarn are

most popular, but customers still appreciate the uniqueness and quality of a carefully handcrafted product. We then expanded into retailing commercial alpaca yarn and now stock a beautiful, and ever-increasing, range of 100% alpaca and alpaca blend yarns.

So, let me tell you about alpaca yarn!

Alpaca yarn is a premium yarn that has been prized throughout history due to the wonderful attributes of alpaca fibre, – which those of you who keep alpacas for fibre will likely know already.

The hollow core of alpaca fibre gives it incredible thermal properties, while being incredibly lightweight, and breathable. Alpaca fibre is one of the warmest fibres known, reportedly three to five times warmer than wool, and its insulative properties are effective against both cold and heat. Alpaca is strong yet supersoft, is hypoallergenic (does not contain lanolin) and doesn't require harsh chemicals to be cleaned. Alpaca fibre is both fire and water resistant. The surface of alpaca fibre is smooth and feels beautiful against the skin. The smooth surface of the fibre also reflects light giving it a glorious lustre. Both huacaya (wua'ki'ya) and suri (soo'ree) alpaca fibre is used in yarn production.

The appeal of yarn made with alpaca fibre is in its warmth and soft cosy feel against the skin. How soft a yarn feels is related to the thickness (diameter) of the fibre used – as fibres become thicker they become stiffer and feel prickly. The diameter of the fibre is measured in microns – the lower the micron the finer and softer the fibre.

Commercial alpaca yarns are often described with the terms baby alpaca or royal alpaca. Baby alpaca has nothing to do with the age of the alpaca, rather indicates that the yarn is made with fibre in the range of 21-23 microns. Royal alpaca describes yarn made with fibre less than 21 microns.



100% Australian grown and processed alpaca yarn is unfortunately limited. A lot of processing of Australian alpaca fibre is undertaken in New Zealand. The vast majority of fibre for commercial alpaca yarn is grown in South America, and some is also processed there. Alpaca is also processed in Europe and North America.

Alpaca yarn is available in a large range of blends, weights, structures and colours.

Blends

While 100% alpaca yarn provides the ultimate in softness, comfort and a beautiful drape, alpaca fibres combine well with other natural fibres into what are known as blends. Fibres of both animal origin (such as sheep wool, cashmere, possum or silk) and plant origin (such as cotton, flax/linen or nettles) can be used. Blending involves combining the different fibres before spinning the yarn. Blends bring together the different characteristics of the fibres used.

Blends are described on yarn labels and are usually expressed as the percentage of the composite fibres as shown below in this label of Moonshine by Juniper Moon Farm .



Alpaca blended with high quality sheep wool results in a yarn that is ideal for winter woollies, being softer, warmer and lighter weight than wool alone. Wool brings what is known as 'memory' to the mix. Memory refers to the ability of a fibre to bounce back, and results in garments that will hold their shape.

The blending of alpaca with cotton results in a soft and breathable yarn that is ideal for lightweight accessories and garments for warmer weather. Alpaca and cotton blend yarns have a smooth matt finish with a firmer feel than alpaca alone. Linen adds similar characteristics as cotton, with a still firmer feel which will soften over time.



Serena by Manos del Uruguay – a blend of 60% baby alpaca and 40% cotton.



Cowl and beanie knit in bee stitch – a simple stitch enhanced by the silk in the yarn blend

Silk has a natural shine which when blended with alpaca results in gloriously lustrous yarn that is ideal for enhancing the definition of even the simplest stitches. This can be seen in this 'bee stitch' cowl and beanie knit with Moonshine, a 40% alpaca, 40% wool and 20% silk yarn. The structure of this yarn adds extra interest.

Alpaca can also be blended with synthetic fibres, for example nylon, added to sock yarn for stretch and durability, but this is not absolutely necessary. Blending alpaca with acrylic seems like an incredible waste.

Weights

A yarn's weight relates to its thickness rather than how heavy it is. Yarns of the same thickness but composed of different fibres (eg. alpaca versus cotton) will likely weigh differently on a scale, but in yarn terminology will be the same weight!

The weight of a yarn will be indicated on the yarn label; however, there are a number of ways this information may be presented (summarised in the table).

The Craft Yarn Council of America (CYCA) system of seven categories is the most straightforward. The yarn weight on the Moonshine label above is described using the CYCA symbol. However, terms such as 'sport' and 'aran' are still widely used, and some manufacturers provide only a stitch gauge and needle size.

In Australia, yarn weight is commonly described using the term 'ply'. The table shows that a # 4, worsted or aran weight yarn is a 10ply yarn. This terminology is heavily rooted in tradition. Historically, a spun thread (or single) - that was then plied with one or more other spun threads to form a yarn, was of a fairly consistent thickness and the number of threads plied together would have been a fairly accurate representation of the resultant yarn's weight. This is no longer the case as the thickness of a single can vary dramatically. Describing yarn weights in terms of ply is simply another name for its weight.

Another way to express yarn weight is wraps per inch (WPI). WPI is measured by wrapping the yarn around an object with a consistent circumference, then counting how many wraps are in an inch. A chart, such as the table below, is then used to determine the yarn's weight. The yarn should be wrapped so it sits snugly side by side without overlaps and without gaps between the strands, and be in a relaxed state (not wrapped too tightly). There are many beautiful tools available for measuring WPI, but it can be done with just a pencil and tape measure. Wraps per inch is useful for establishing the weight of handspun yarn and yarn from your stash without its label.

1. Source: Craft Yarn Council of America – www.YarnStandards.com

2. Stockinette stitch over 4in/10cm

3. Single crochet (US) / Double crochet (UK) over 4in/10cm

If uncertain, your yarn supplier should be able to tell you a yarn's weight in terms that make sense to you. Our website includes yarn weight in Australian terminology in the description of all yarn sold.

Yarn weight is important because, together with the size of the knitting needles or crochet hook used, it will determine the gauge of the knitted or crocheted fabric produced. Gauge is the number of stitches and rows per inch or per 4-inches/10-centimetres. Gauge affects the size of the finished product and, while it may not be important for a scarf, it is critically important for a cardigan or jumper if you want the finished item to fit. Gauge also varies from person to person as people knit or crochet with different tension - looser or tighter than others. For patterns where gauge is important, taking the time to do a gauge swatch and adjusting your needle or hook size accordingly will avoid disappointment later.

Yarns with the same weight can often be substituted in a pattern. But remember, the fibre in the yarn and the yarn's structure may also affect the drape, stitch definition or feel of the finished product, so do a swatch to be sure. Different weight yarns are better suited for different products. A thin yarn like a lace through to a sports weight, will suit a light and airy shawl, while a thicker yarn like an aran or chunky weight, will suit a warm and cosy cowl.

CYCA Symbol ¹	Name	Ply	Wraps per Inch	Knit Gauge ² Needle Size	Crochet Gauge ³ Needle Size
 LACE	Lace weight Fine #10 thread	2 ply 3 ply	30 plus	33-40 sts 1.5-2.25 mm	21-32 sts 1.6-1.44 mm
 SUPER FINE	Fingering Sock	4 ply	19 to 30	27-32 sts 2.25-3.25 mm	21-32 sts 2.25-3.5 mm
 FINE	Sport	5ply	15 to 18	23-26 sts 3.25-3.75 mm	16-20 sts 3.5-4.5 mm
 LIGHT	DK Light Worsted	8ply	12 to 14	21-24 sts 3.75-4.5 mm	12-17 sts 4.5-5.5 mm
 MEDIUM	Worsted Aran Afghan	10ply	9 to 11	16-20 sts 4.5-5.5 mm	11-14 sts 5.5-6.5 mm
 BULKY	Chunky Craft	12 ply	7 to 8	12-15 sts 5.5-8 mm	8-11 sts 6.5-9 mm
 SUPER BULKY	Super Bulky Roving	Over 12 ply	5 to 6	7-11 sts 8-12.75 mm	6-9 sts 9-16 mm
 JUMBO	Jumbo Roving	Over 12 ply	1 to 4	6 or less sts 12.75 mm plus	5 or less sts 16 mm plus

Structures

The structure of a yarn refers to how the yarn is made up and how it looks.

Spun yarn is described in terms of ply (not to be confused with the names given to yarn weights as described previously). Ply refers to the number of singles spun together to form the yarn. Ply doesn't determine the weight (thickness) of the yarn as the thickness of the single strands can vary. So, you can have a # 0, lace 2 ply yarn or a # 3, DK 4 ply yarn or a # 5, chunky 2 ply yarn – in Australian terminology a 2 ply 2 ply yarn or an 8 ply 4 ply yarn or a 14 ply 2 ply yarn!!



Left to right: 2 ply 2 ply, 8 ply 4 ply, 14 ply 2 ply – 100% alpaca yarn

Classically spun yarn is usually even and smooth and will produce an even and smooth fabric. However, the type of fibre used in the yarn can affect this, and a classically spun alpaca yarn will usually have some degree of 'fuzz'.

Halo style yarns are designed for their fuzziness. They have a central core of yarn with a cloud of fibre extending out from it. Cumulus is a heavy lace 3 ply yarn with a glistening core of mulberry silk, and a gentle halo of super soft baby suri alpaca, like soft pillowy clouds, - hence its name. Halo style yarns are lovely to work with and create the softest knits with beautiful drape and a delicate haze.



Cumulus by Fyberspates – a halo style yarn



Sisa by Mirasol – an icord style yarn

Other yarn structures in which alpaca and alpaca blend yarns are available include: roving, boucle or icord yarns. Roving or single ply yarn, has minimal structure, often with only a light spin or at the extreme no structure, just a long narrow bundle of fibre like a spinner would use. Roving style yarn is usually no less than 10-12 ply, and at its bulkiest is used for finger and arm work rather than needles and hooks. Boucle yarns are fancy or novelty yarns that consists of loose curling loops of yarn projecting from a yarn core.

Icord yarn, also referred to as chainette or tube-spun yarn, has the structure of a little tube of knitting with a hollow core. Its appearance is like a chain mesh or fine French knitting, or what you would create yourself using the icord knitting technique and a fine yarn. The hollow core increases the weight (thickness) of the yarn without increasing its weight, and gives these yarns excellent thermal properties. Icord yarns are elastic, give beautiful stitch definition and are great for jumpers and cardigans which will be thick and warm but lightweight.



Handspun yarn (left) and Moonshine by Juniper Moon Farm (right) – variable thickness yarns

Unique and varied yarn structures can also be created by plying together singles composed of different types of fibre – a different type of blending.

Variability in the thickness of a yarn along its length, common in handspun yarns but also in some commercially spun yarn varieties, adds interest and texture to the finished fabric. Moonshine is an example of a single ply yarn with subtle thickness variation along its length. Variability in handspun yarns may be a reflection of the skill of the spinner; however, a skilled spinner may also intentionally wish to add variability to their yarn (which can be harder to do than you might think).

The term worsted, which in yarn weight terms is used to describe a # 4 or 10 ply yarn, is also used to describe yarn structure. Spun yarns can be described as woollen or worsted. Woollen spun yarn is looser, while worsted spun yarn is tighter. This affects the look and feel of the yarn, the look and feel of the finished item and other characteristics such as how the yarn takes up dye.



Tacama Organic by Chaska

Colours

Alpaca fibre comes in a beautiful range of natural colours – from the brightest white to true jet black, with fawns, browns and greys in between. Handspinners and mini-mills usually produce yarn ranges that are the natural undyed colour of the fibre, that can often be traced back to the animal that produced it. Tacama Organic is a range of alpaca and cotton blend yarns that use no dye - just the natural alpaca fibre colour blended with cotton.

Alpaca fibre can also be dyed and alpaca and alpaca blend yarns are available in just about any colour imaginable. If you are not be able to find the colour you are after you can dye it yourself or find a dyer to do it for you.

There are many terms to describe the character of a yarn's colour.

Solid colour yarn is yarn dyed a single colour. It is even in colour without any variation along the length of the yarn. When there is variation in the intensity of a single colour throughout a yarn it is described as semisolid. Heathered is another descriptor for yarn with lighter sections dappled

throughout the main colour. Semi-solid colour is commonly achieved using a technique called kettle-dyeing and produces a soft and weathered look (like stonewashed).

Variegated yarn is multicoloured. The colour varies along the length of the yarn, and the variations can be of subtle similar colours or stark high contrast colours. How quickly the colours transition along the yarn has a significant effect. Yarns with short lengths of colour result in a fabric with soft melding of colours. Yarns with long lengths of colour produce solid sections within the fabric which may stripe or pool. Gradient yarns, also called ombres, have extra-long lengths of colour that subtly progress from one colour to another or progress from light to dark along the length of the yarn without repeats.



Alpaca Heather in Poema by Manos del Uruguay – a variegated yarn with short colour transitions.



Alba in Rose by Jody Long – a modern tweed yarn that blends alpaca and merino with accents of viscose sourced from sustainable forestry.



Tweed yarn has a solid or semi-solid background with flecks of contrasting colour accents. Semi-solid backgrounds often result from different fibres in the yarn taking up dye differently. Tweed yarns produce a speckled fabric.

Marled yarns are produced by plying two or more singles of different colours together into a yarn that has the appearance of a candy-cane or barber's pole. Marled yarns produce a mottled fabric. This effect is easily created by simply holding two yarns of different colour together when knitting or crocheting – in essence creating your own marled yarn.



Pura Lana Ecologica by Sesia – an alpaca and wool blend with a range of two and three coloured marls (top), knit in a 2x2 rib variation (above).

Other information on alpaca yarn labels

Most commercial yarn is dyed in batches which are allocated a dyelot that is included on the yarn label. Balls or skeins of yarn from different dyelots often look to be the same shade, but reveal noticeable difference in the final fabric. When buying more than one ball, be sure the dyelot numbers are the same. This can be an issue when buying online; however, it should not be a problem if buying from a specialist yarn retailer.

Yarn labels also include care instructions, which provide the information needed to wash and dry items made with the yarn correctly. These instructions are often conveyed in the form of symbols which can be decoded by reference to sites such as All Free Knitting - Yarn Care Symbols.

The quantity of yarn in the ball or skein is shown in grams and, in this case, the weight does reflect how heavy the yarn is! A 50 g ball of yarn consists of 50 g of yarn. However, a 50 g ball of a 2 ply alpaca yarn will contain a significantly longer length of yarn (about 400 m) than a 50 g ball of an 8 ply alpaca yarn (about 100m). For a given fibre, the length of yarn in a given ball weight can be used to estimate the yarn weight (thickness).

Finally, and most importantly, your chosen yarn must be a delight to work with and achieve beautiful results. Selecting the right alpaca yarn for your project will deliver every time; and you are sure to find alpaca yarns that you will come back to time and time again.

Teanelle – Fibre Yarn Textiles is owned and operated by Louise and Tim Wood. Website: teanelle.com.au

Why do Camelids Roll?



By Julie McClen - Oak Grove Alpacas

If you own alpacas or llamas you are familiar with their love of rolling in the dust or what is known as dust bathing. They create numerous 'baths' throughout their paddocks and delight in rolling, often several at once in the same bath, creating large billowing dust clouds in the process, and even more dust when they shake off the excess as they exit the bathing area.

The dust they accumulate in their fleece doesn't all get shaken off though and when they are shorn the fleeces are often dusty, and darker layers of this dust can be seen in the shorn fleece, not unlike sediment layers in exposed river banks. This dust washes out quite readily, but can make the shorn fleece appear to be a different colour than it is to varying degrees, depending on the colour of the soil the camelids are bathing in. This coloured layer can clearly be seen in this fleece sample taken from a shorn fleece.

Dust bathing is a form of grooming for camelids, it is an innate behaviour that even young cria indulge in from an early age. They will at times try to roll even if wearing a coat for weather protection and llamas with packs on will attempt to also roll at times.





< A llama getting ready to roll

The dust baths camelids create can over time become quite deep, potentially creating a problem for tractors or other machinery you may use in your paddocks. You will not be successful in stopping them creating these baths, the best you can do is to encourage them to create a bath in a different area of the paddock. A method we have found that works well is filling in the bath by knocking the edges in to create a more even flatter area, and then placing some of their manure on top of the old bath. This often leads them to abandon the bath and most likely turn it into a dung pile instead, as the smell of their manure often triggers the need to go to the bathroom for something more than a dust bath.

Dust baths often become water baths when they fill up after heavy rain creating a mud bath experience. The mud doesn't seem to deter all of them and some will continue to use the bath and roll in the mud. Something to be aware of if you are about to show your animals, or have them shorn soon after as it is preferred to keep the fleece as clean as possible for both these events.

The rolling action serves a dual purpose, firstly it most likely feels good, like scratching your back in the bathtub with a brush. It is also believed that the dust helps dislodge and discourage parasites from living in the alpacas fleece so provides a dual action.

Camelids also groom themselves in other ways including using their hind legs to scratch their abdomens, front legs, ears and even for the more flexible amongst the herd the top of their head. Rubbing against fence mesh and fence posts and using young tree sapling as belly scratchers add to the grooming repertoire.

Dust bathing for camelids is part of life and a part they seem to enjoy as we owners get enjoyment in turn from watching their grooming antics.

This group of alpacas are relaxing next to one of their dust bath areas.





SO YOU'RE INTERESTED IN STARTING WITH ALPACAS?

By Esme Graham

Perhaps you have seen these attractive animals at a local show or in someone's paddock? Maybe you have always wanted alpacas but have only recently found a property to keep them? Alpacas are a niche market and to avoid buying the wrong animals you have a few decisions to make.

If you have several acres and are looking for a long term investment as a small scale breeder the prices achieved for sales will depend on the quality of the fibre and colours. The key to success for a small herd is excellent conformation and good quality fleece.

- Are you interested in the social and marketing opportunities of the showring and want to breed show quality animals. The above qualifications are also a necessity.
- Do you have chickens, lambs, goats – alpacas can be good guard animals they have incredible eyesight, good guard instincts and bond well with your other pets. Castrated males are usually used for this task but it is also a role for non-breeding females. While a healthy alpaca is a necessity fleece quality is not so important
- Perhaps you are a sheep farmer who is losing lambs to foxes or eagles – there are many instances of alpacas herding a flock away from danger or just helping to move flocks from paddock to paddock. Castrated males or non breeding females are probably best for this role and many farmers prefer white or light fawn alpacas so there is no fleece colour contamination with their sheep.
- Are you involved in the tourist industry and would like to have alpacas to interact with visitors who can take them on walks or have photos taken with them. They are also being used as therapy animals and taken to residential care facilities where they quickly build an affinity with the residents. The temperament is the most important feature for these animals.
- Do you think you would just like a couple of alpacas as pets? Keep in mind that alpacas are herd animals and cannot usually be treated like you would a cat or dog. Keep in mind that because they are herd animals you need two and preferably three in the paddock together. Whilst the quality of the fleece may not be important, temperament is important and pets need to be halter trained.

Alpacas can be run at a similar stocking rate to sheep unless you are prepared to extra feed them on a regular basis. However, keep in mind that healthy alpacas need room to move around freely and not be shut in small areas for long periods.

Once you have considered your land area and your reasons for buying alpacas you are ready to start looking for the right alpacas to suit your requirements.

BUYING YOUR FIRST ALPACAS

Good quality breeding stock and show animals are not cheap so make sure you do your due diligence. You wouldn't buy a car or expensive household equipment without some sort of guarantee so don't buy an alpaca unless you are happy with what you are being told. As a starting point visit as many alpaca farms as you can to see what is available – don't buy the first ones you see and fall in love with!

Important guidelines before selecting

- Learn as much as you can about alpaca confirmation, fibre and price structure before you select.
- Realise that the duty of a breeder or an agent is to sell you stock.
- If you are not confident employ someone reputable to select for you.
- Select with 90% brain and 10% heart!
- You or the selector are not veterinarians, if something about an animal bothers you ask for a vet check.

What should you expect from the seller?

- Alpacas should be fully vaccinated with health records available.
- Fleece statistics should be available for multiple years.
- Be advised what the current feeding regime is.
- AAA registration IRA number should be provided for all registered alpacas.
- Pregnant females should have a live cria guarantee.

Enjoy your journey with alpacas!





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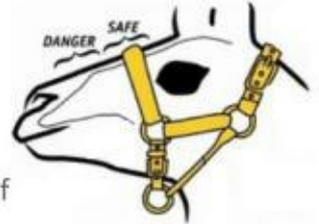
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American Alpaca And Cotton: A Natural Pairing



Yarns and textiles made from a blend of alpaca fibre and cotton are increasingly easy to find, their popularity driven by the comfortable, three-season appeal of this blend of natural cellulose and protein fibres. While historically these yarns have almost exclusively been milled overseas, we are excited to report increasing opportunities to produce alpaca/cotton blend yarns in this country as well.

This should lead to some interesting new retail options for alpaca products stores, especially those that operate in areas with warmer weather, focus on selling regional or all American products, or whose customers tend to prefer products made from natural fibres to those incorporating synthetics. It's worth getting to know more about how this fibre blend performs and what products made from it can do for your retail business.

A Compelling Blend

It might not be obvious at first blush why cotton and alpaca fibre would combine well. Cotton, after all, is a relatively short, inelastic cellulose fibre and alpaca is a longer, more elastic protein fibre. But both are fine, strong, naturally hydroscopic (water absorbing, or "wicking"), chemical-free natural fibres, the production of which results in much lower emission of carbon dioxide than does the production of polyester fibre. Unlike synthetic fibre, cotton and alpaca fibre is also biodegradable and even, depending on how the fibre was dyed and treated during manufacturing, compostable. And not just alpaca but cotton, too, is grown in a range of natural colors that include tan, brown, pink and even green in addition to the familiar white.

The alpaca/cotton blend extends the seasonal range of both fibre types in yarns and finished goods. Alpaca improves on cotton's wrinkle resistance, resilience and insulating properties; cotton blended with alpaca adds valuable consistency and the opportunity to spin even finer yarns. But there are also business reasons to consider the blend. One is that cotton fibre also costs less than alpaca, reducing the potential cost of products made with the blend relative to those made with alpaca alone. The second is that the processing options and vast market reach of cotton, the most widely used natural fibre in the world, creates product opportunities that don't exist for the tiny alpaca sector. In that respect, we thought it worthwhile to evaluate some of the existing blended alpaca/cotton products to see what we could learn.

The Market For Alpaca/Cotton Blends

Alpaca and cotton appear together in many hand-knitting yarn fibre blends, but we were interested in understanding learning more about yarns made exclusively or predominantly from these two fibres, rather than those that just included them in small proportions. We found 17 popular alpaca/cotton yarns and took a closer look at their sourcing and construction.

Almost all of these yarns were manufactured in Italy or Peru. Chainette was the most common construction style. Chainette yarns are made by knitting together multiple fine gauge plies into a lofty, light yarn with incremental elasticity, a particular benefit when working with inelastic fibres like cotton. The style also accommodates a range of fibre lengths. Some of the chainette style yarns were made from individual singles of blended alpaca and cotton and some were made from plies of exclusively alpaca or cotton that were knit together to create a composite yarn. The characteristics of the chain construction play an important role in determining how these yarns perform in knit goods.

There were also several yarns made from alpaca singles plied with cotton thread, as well as a couple featuring alpaca fibre spun around a cotton core. Hybrid yarns like these will have the inelasticity of their cotton component, but the soft hand and some of the warmth of the alpaca. Although they were collectively less common, there were also a few true blended yarns made from alpaca and cotton that had been blended before spinning as opposed to combined during spinning: The lovely two ply Serena Semi Solid yarn produced by the artisanal group Manos de Uruguay, made from 60% baby alpaca and 40% pima cotton, was particularly nice example of the type.

Most of the alpaca cotton yarns were not solid in color but were designed and marketed as heathers. Heathers are quite popular generally in the hand-knitting yarn market and are also easier to produce from the alpaca and cotton fibre combination than are uniform solid colors. There were also some absolutely stunning lines of natural color yarns, including the Purl Soho Sweetgrass yarn (65% organic cotton, 35% alpaca), which comes in fingering and lace weights and is manufactured in Peru.

Alpaca/cotton blend knit clothing and accessories are also popular right now, with companies like Brooks Brothers, Eileen Fisher, Rag & Bone, Garnet Hill, and many others offering everything from sweaters to t-shirts and wraps made with variations on the blend. Again, where we can ascertain their source the yarns appear to come from Italy or Peru.

Often the yarns for these products incorporate additional fibres like merino or nylon. We also see woven alpaca/ cotton products in the market, most often made from fabric with a cotton warp and alpaca weft rather than being made from blended or composite yarns.



“ The beautiful Sweetgrass yarn line from Purl Soho. It is our goal to be able to manufacture a yarn of this type in the U.S. soon. Try this yarn and you will see why! ”

Blending American Alpaca With Cotton

Of course, making products like those described above in the U.S. from U.S. grown cotton and alpaca presents incremental challenges. It's difficult for already stressed U.S. mills to find the time or economic justification to experiment with spinning new fibre blends. But demand for American-grown and made products from retail brands has been increasing, as has consumer interest in goods made from sustainably grown fibre. In this latter respect, American cotton can offer additional environmental advantages: It is more likely to be grown on non-irrigated land than is cotton produced in other countries, and also more likely to be produced using technology and management practices that minimize or even eliminate the use of herbicides, pesticides and synthetic nitrogen. Cotton's tolerance for higher salinity water has even led some producers to use reclaimed waste water to grow their crops: We know of one cotton farm that uses reclaimed water from a nearby mozzarella manufacturing facility.

Our partner Stacie Chavez of Imperial Yarn worked with one U.S. worsted spinning mill to develop a cotton/merino blend production yarn that has in turn created opportunities to incorporate alpaca fibre in a similar yarn. Even with the familiar merino content, the addition of cotton created real challenges for a worsted mill. Initial attempts to spin from a blend of cut merino top and loose, clean longer-stapled cotton that had been combined in the carding machine failed at the spinning frame. But a subsequent approach that combined the wool top with brushed cotton sliver during the drawing stage worked well and the mill produced a high twist single at the fine gauge that is most in demand for the so-called "production" yarns that manufacturers use to make knitted garments.

Now that we know how to produce these merino/cotton production yarn blends at a U.S. worsted mill, all-American alpaca/cotton blends can follow, spun both for manufacturers and for sale to yarn brands and craft knitters. But even as Imperial Yarn works to develop these options further, alpaca growers can work with their regional semi-worsted mills and even mini mills to develop their own alpaca/cotton blend yarns. Based on our own experience, we would make the following recommendations for this process:

1. Supply your mill with long-stapled cotton roving. Most cotton grown in the U.S. and abroad is short stapled upland cotton, but you can also find long-stapled pima cotton roving for your products. The longer staple of the pima cotton will allow you to design more luxurious feeling yarns and make the yarn manufacturing process easier for your mill.
2. Choose the right alpaca fibre for your blend. Cotton fibre is typically very fine and should be blended with uniform royal or baby grade alpaca fibre to create the highest quality yarns.

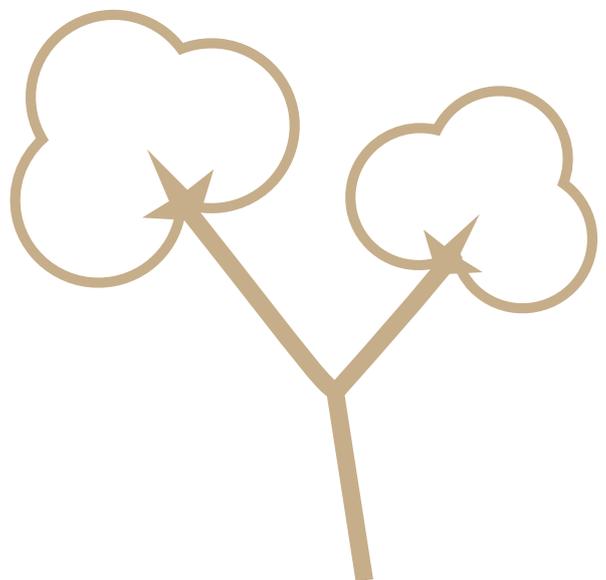
3. Choose a yarn style and weight that allows for both a nice hand and fibre control. Those short straight cotton fibres take more twist to hold together than your long-stapled alpaca does, so look for ways to let the yarn made from it relax without falling apart. You'll do better with plied yarns than single-strand ones. Don't aim for a finer gauge yarn unless you are supplying very uniform and fine alpaca fibre and the mill is capable of producing a very consistent blend.

4. Embrace color variation. It's challenging to dye cellulose-based cotton fibre the exact same color as your protein based alpaca fibre, so why try? Design fun colorways that make natural variation a selling point. And while we are talking about color: Consider new colorways for three-season appeal.

5. If your mill can produce yarns with a high percentage of cotton relative to alpaca, try it! We see high percentage cotton/alpaca blends (in the 80% range in terms of cotton content) advertised as machine washable and dryable, which is a big sales advantage. High percentage cotton yarns also stretch scarce alpaca fiber and can lower the retail price point of your products.

6. Augment your pattern library. Patterns sell yarn, and your new alpaca cotton blend yarns may sell better with patterns for things like baby blankets and summery wraps than they will with patterns for scarves and mittens. This is particularly true if you produce finer gauge yarns with a higher percentage of cotton.

7. Co-brand with your cotton supplier if you can. If you are buying American cotton you may have the opportunity to source fibre produced by a particular farm or in accordance with an environmentally protective production system like that required by Textile Exchange's US Cotton Trust Protocol or Fibershed's Climate Beneficial Farming verification. Use those assets to your advantage.



“ From boll to
blended skein: We
can manufacture
beautiful alpaca/
cotton blend yarns
in the U.S. ”



REGENERATIVE AGRICULTURE

Are We At War With Nature?

By Lorraine Gordon

The closer we get to tipping points of runaway biodiversity collapse, soil degradation and climate change, the more we need to accept that we're part of a complex ecological system beyond our control. Our path to ecological reconciliation will be paved not only by the way we farm, but in the stories we tell and the language we use.

Off the back of the toughest drought in Australian history, November 2019 saw my family farm simultaneously 'smashed' between two major fires in NSW – the Ebor fire at one end and the East Cattai fire at the other. This took out approximately 20 kilometres of boundary fence and \$700,000 in infrastructure.

In a few hours, these catastrophic fires completely devastated our landscape. Come March 2020, our entire operation was shut down for much of the remaining year. Flood conditions caused a series of avalanches on the mountain to our farm, which resulted in road closures and cut us off from staff and contractors for nearly 6 weeks. Everyone was forced to drive three hours to get around this disaster and come to work.

Such double-barrelled crises are now familiar for many Australians, particularly farmers who so often bear the inordinate brunt of climate and economic instability.

As a community, we will continue to feel the worsening brunt of these extreme weather conditions as we face the reality of climate change.

Planetary boundaries is a concept involving Earth system processes that contain environmental boundaries. The framework is based on scientific evidence that human actions since the Industrial Revolution have become the main driver of global environmental change.

Planetary Boundaries are currently unravelling and causing us to rocket away from the stability of the Holocene; climate change is only one of these systems. Without significant change in the way the population operates, including how we conduct agriculture, human activities will continue to destabilise our planet.

Over 50 years ago, the term 'Regenerative' was developed by systems theorist Charles Krone in the US to describe a radically different paradigm of approaching human and systems development.

Leading Academic Agronomists agree that agriculture is in crisis. Soil health is collapsing. Biodiversity faces its sixth mass extinction. Crop yields are plateauing. Against this crisis narrative swells a clarion call for regenerative agriculture" (Giller, Hijbeek, Andersso, & Sumberg, 2021).

Agriculture occupies 38 per cent of the planet's total landmass. It is therefore a significant influencer on our planetary systems. Firstly, agriculture has tipped biogeochemical flows through overuse of phosphorus and nitrogen. It has also risked biosphere integrity by decreasing genetic diversity within species.

Other impacts are felt around land-systems change, freshwater use and climate change. We need to invite resilience back into agriculture if we are to survive in an increasingly hostile and fragile environment.

In 2018, I founded the Regenerative Agriculture Alliance (RAA) at Southern Cross University as a venture to enable a large-scale transition to regenerative agriculture in Australia. I recognised that Collaboration between Australia's leading researchers, teachers and practitioners, was the key to advancing regenerative agriculture outcomes. In partnership



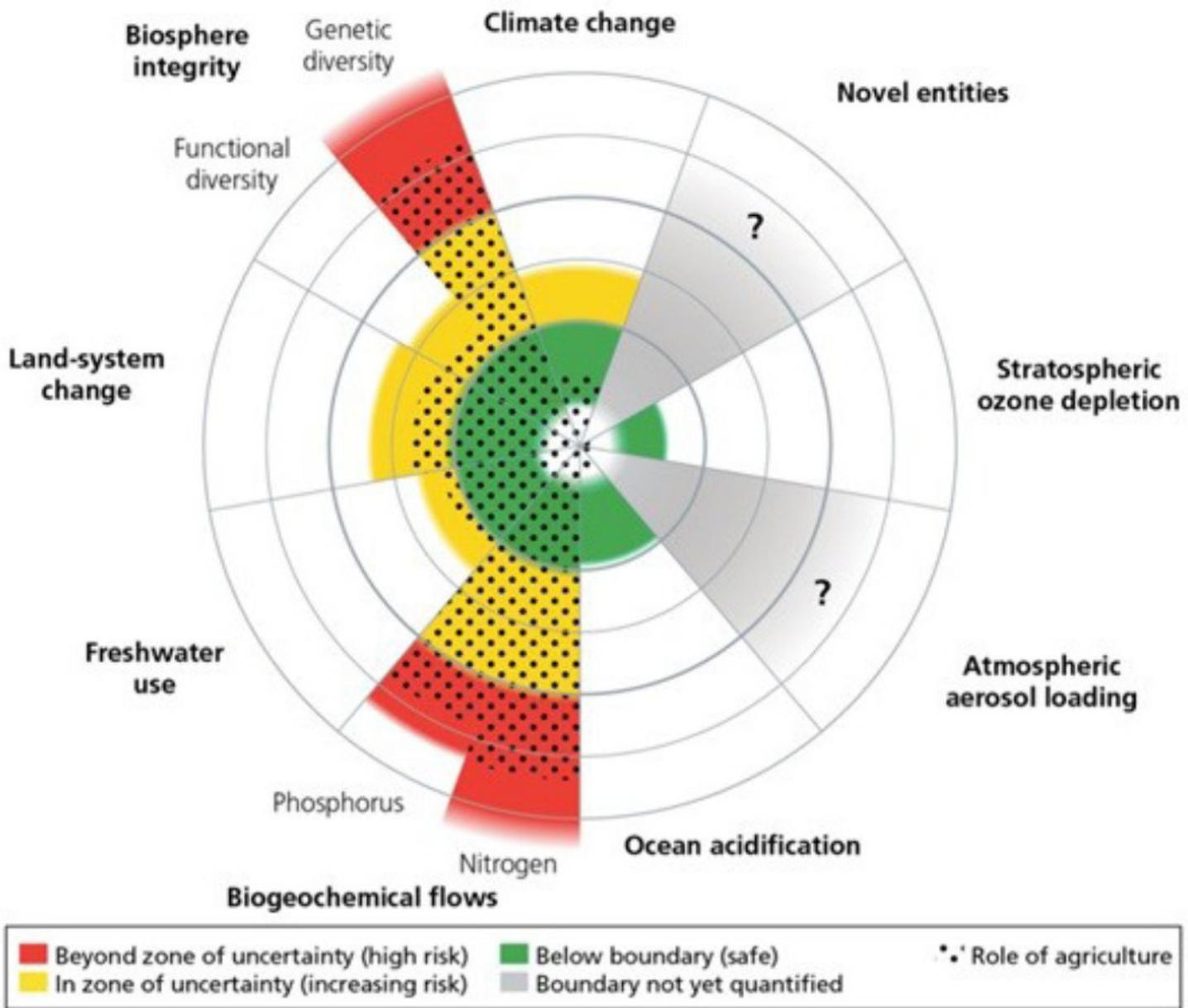


Figure 1: The role of agriculture in overstepping planetary boundaries. (Campbell et al., 2017)

with the Farming Together program, RAA is committed to translating its research findings into practical regenerative agricultural solutions, bringing all farmers in the country along on the journey together.

We also recognise the importance of educating the next generation of farmers in resilience disciplines to help them cope with a changing climate. Hence, we created the Bachelor of Science specialising in regenerative agriculture and the Graduate Certificate leading to a Masters in regenerative agriculture at Southern Cross University. Having adopted the necessary changes in the way agriculture is taught and understood in Australia, Southern Cross University is a pioneer in the regenerative agriculture landscape.

If I am going to continue to advocate, research and to educate, as a recognised leader in the field, it is important that "I walk the talk" on my own farm. As an early adopter of

carbon farming, registered with the Emissions Reduction Fund, I am happy to make the mistakes, learn from them and use this experience to help others with the process. Carbon co-ops like the ones currently being developed in Northern NSW, are now my focus for creating change, impact and scale. In a nut-shell, the co-operative structure will ensure profits remain with farmers whilst they walk this often complex journey together.

At the heart of it, we need to decide whether we're going to continue trying to dominate and control the ecosystem or accept that we're part of that system; integrated within the web of life. This decision starts with the way we use language, particularly how we frame our current crisis.

For example, metaphors used by a former fire Chief when speaking about the 2019 Australian bushfires were, in my opinion, unfortunate i.e. "The enemy is geared up ... it's like [the enemy's] suddenly got nuclear weapons." He then remarked that, "climate change was the enemy"! This was echoed by another former fire Chief who went further

suggesting "national military-style training" to deal with the "locality of battles in a greater climate change war."

I applaud the efforts of our country's brave firefighters and have personally worked beside them in the recent NSW bushfires. However, I never thought for one moment that we were at "war" with Nature. Indeed, as the Indigenous fire practitioner and author, Victor Steffensen says, "the only reason we are seeing all this degradation to landscape is not just because of climate change, but it's because of bad management." Interesting we are seeing the same sort of narrative unfold with COVID-19, using military language such as "at war" and "fight the virus" only to learn the hard way that we are going to need to live with it and adapt our lifestyles accordingly.

In a recent article by PhD Candidate Ethan Gordon at the UTS Institute for Sustainable Futures, "How Language shapes our Landscape Decision Making" he asks "what is the consequence of treating ecological systems, that are in distress because of human actions, as if they are a nuclear enemy? To fight and destroy the environment is to fight and destroy ourselves. Human beings are in no way separate from the natural world ... this approach has narrowed foresight; no longer can we see the potential for ecological reconciliation. Instead, we only see the 'enemy.'"



Let's contrast these metaphors with those of our First Nations people. They speak instead of "fire knowledge holders" and "becoming part of country." Note the difference in metaphor use. According to Gordon, these differences in metaphor use reflect competing discourses. The former is born of colonialism "and hence carries heavy militaristic symbolism." He says, "this is not a reflection of the individuals who have spoken these words, so much as it is a reflection of a society still gripped with colonial power. This power dynamic is clear in the metaphors as they reinforce independence, specialisation and control. They align with common conceptual metaphors that shape western thinking on nature."

Genetic diversity is the total number of genetic characteristics in the genetic makeup of a species, it ranges widely from the number of species to differences within species and can be attributed to the span of survival for a species.





The Principles of Regenerative Agriculture are what underpin the practices and should guide your actions. They include:

1. Think holistically
2. Think ecologically and understand complex, adaptive systems
3. Be comfortable in ambiguity
4. Have the capacity for continuous, transformative learning
5. Make place-based decisions, within bio-regions
6. Understand that human cultures are co-evolving with their environments
7. Acknowledge and involve diverse ways of knowing and being in landscapes
8. Participate in cultural and ecological reconciliation

My personal approach to agriculture is to work with nature and do my best to understand the lessons she imparts. And to remember that we need her more than she needs us. I shall continue to earnestly watch this so called “battle” unfold. It is clear who will win, so we best get onside now with nature, embrace her in all her complexity, listen to and fully acknowledge and respect what she is telling us.

Regenerative Agriculture is defined as: "A system of farming principles and practices that increases biodiversity, enriches soils, improves watersheds, and enhances ecosystem services. Terra Genesis International

Get involved in regenerative agriculture

The Regenerative Agriculture Alliance publishes a monthly newsletter with the latest opportunities in regenerative agriculture and collaborative farming. Email raa@scu.edu.au to subscribe and get involved.

For more information:

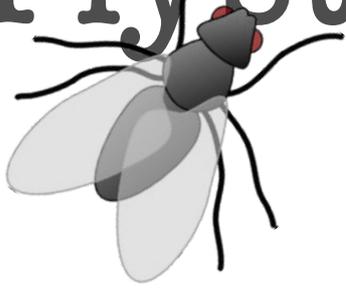
The Regenerative Agriculture Alliance: www.scu.edu.au/regenerativeag/

Farming Together Program: www.farmingtogether.com.au

Ref: Giller, K. E., Hijbeek, R., Andersso, J. A., & Sumberg, J. (2021). Regenerative Agriculture: An agronomic perspective. *Outlook on Agriculture*, 50 13-25. doi:10.1177/0030727021998063

Lorraine is the Founder and Director of the National Regenerative Agriculture Alliance. As Director of Strategic Projects at Southern Cross University, Lorraine acts as a conduit between industry and research, delivering regenerative agriculture solutions nationally with a focus on mitigating the effects of climate change. She was the instigator and co-designer of the Bachelor of Science majoring in Regenerative Agriculture – the only degree of its kind in the world and now the largest agricultural degree in the country. She has assisted over 28,500 farmers, fishers and foresters around the country to progress collaborative projects including establishing Cooperatives which will benefit their various industries as Director of the Commonwealth Government’s Farming Together Program. Lorraine was awarded the 2018 Rural Community Leader of the Year for Australia for her work with farmers, the 2019 Australian Financial Review Award and the 2019 BHERT Higher Education Engagement Award. She was also a finalist in the 2020 Australian of the Year Award. Lorraine is also a carbon farmer and beef cattle trader at Ebor in the New England Tablelands.

Flystrike In Alpacas



By James Wheeler - Kobler Alpacas

James Wheeler is an alpaca breeder and shearer. James shears thousands of alpacas across South Australia and other states and has seen increasing flystrike incidents in alpacas this season. In one week alone this Summer he saw flystrike everyday in alpacas in his shearing rounds.

FLYSTRIKE IN ALPACAS

While not as common as in sheep, flystrike in alpacas occurs where flies lay their eggs in faeces contaminated wool or open wounds. Upon hatching, the larvae work through the fleece and eventually enter the skin, where they feed upon the alpaca's flesh. Once a maggot infestation has commenced, it becomes an attractive environment for flies to lay more eggs restarting the infestation.



CAUSES OF FLYSTRIKE

Flystrike is most likely to occur in still (low windspeed) warmer (18-38c) conditions after recent rain. Overgrown fleece presents a higher risk, as do untreated injuries, which create a moist environment on the skin. Untreated fungal/bacteria toe issues are another underlying issue that can get fly blown.

IDENTIFICATION OF FLYSTRIKE

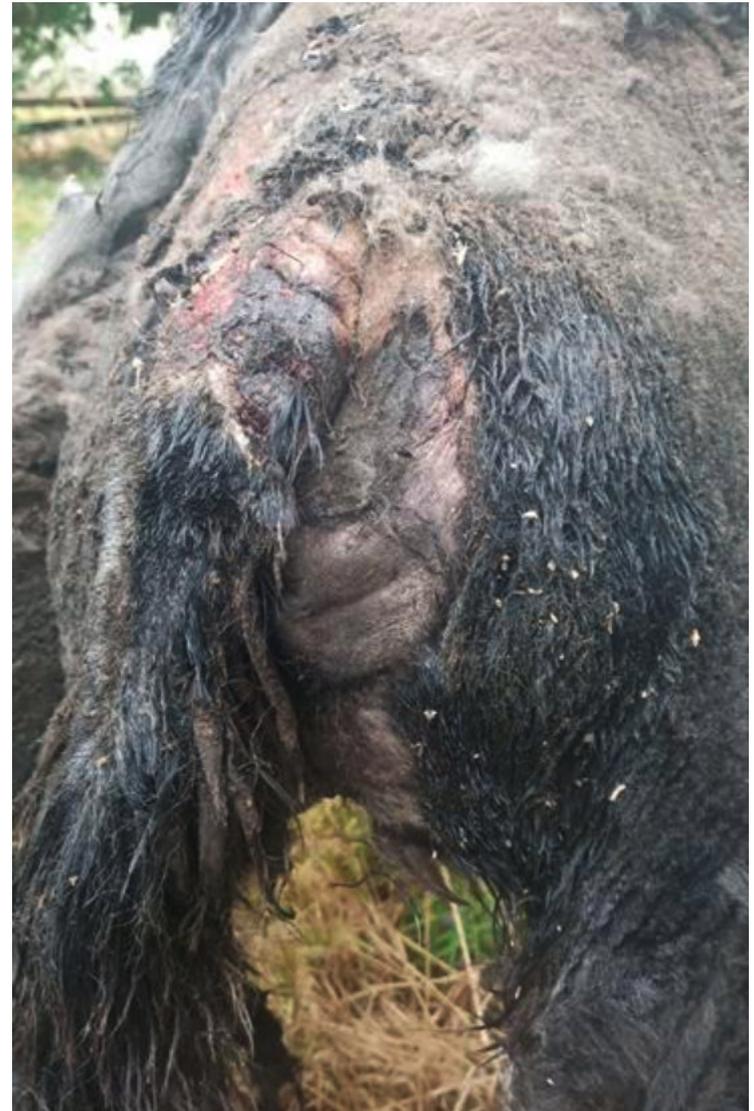
Flystrike has a very distinct and instantly recognisable smell, similar to rotting meat. Affected areas may result in green fleece or a dark, wet-looking site. Maggots or flies may be visible.

TREATMENT OF FLYSTRIKE

Remove the affected fleece creating a clean border of at least 3 cm. Exposing maggots to the sun alone does not guarantee the eradication of a maggot infestation. Applying a chemical fly treatment such as Extinosad® Aerosol for Wounds would greatly increase the recovery time.

PREVENTION

- Arrange for yearly shearing of your alpacas
- Conduct regular health checks of your animals
- Investigate green or black patches on alpacas in consultation with your vet



EDITORS NOTE

Here at Oak Grove Alpacas we have had a few cases of flystrike caused by wet weather creating hot spots under the fleece after moisture penetrated. We have flushed the maggots out of the wound with saline, then applied Cetrigen to the wound. We have found Cetrigen works well to treat the wound and keep flies away while it heals. It has an adjustable nozzle that squirts a stream several metres which can be helpful in applying it from a distance, reducing the need to catch your alpaca each time you want to treat the wound.



PRICELESS INCAN CARVING TO HEAD HOME

A priceless Incan carved wooden vessel, known as a canopa, will soon be on its way back to its rightful home in Peru.

4 November, 2021

The Incan canopa carved from the fork of a tree, depicts two llamas. It has a characteristic rounded hollow on its back, where offerings were dedicated to the care and fertility of animal herds.

The beautiful piece that dates back to the Incan Empire (1440–1532 CE) was returned today to the Ambassador of Peru, His Excellency Miguel Palomino de La Gala, in a special handback ceremony at the Embassy of Peru in Canberra.

The canopa was intercepted by the Australian Border Force upon arrival from the USA, under suspicion that its export from Peru contravened that country's cultural property laws.

The Office for the Arts was called in to investigate and, after consulting with pre-Columbian cultural experts, determined there had been a breach of the Protection of Movable Cultural Heritage Act 1986. Steps were then taken so the canopa could be given back to the Peruvian Government.

The return is timely given the upcoming 51st Anniversary of the UNESCO Convention Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property 1970 and the International Day Against Illicit Trafficking in Cultural Property on 14 November. Peru and Australia are signatories to this international treaty and will continue to work closely to protect significant objects of cultural heritage.



Australian Government
Department of Infrastructure, Transport,
Regional Development and Communications
Office for the Arts

> *Dr Stephen Arnott PSM, Office for the Arts, and His Excellency Miguel Palomino de la Gala, Ambassador of Peru, at the handover of the priceless Incan canopa at the Embassy of Peru in Canberra.*





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Alpaca Youth Camp

Our wonderful youth 2022 group



Mia and Bethany with their herdsman animals



Alet practising her public speaking skills with Davo



Bethany matching tools with their description with Christie



Rubey showing some of our youth how to tie down a load with ratchet straps



Katy and Mia learning/practising haltering an alpaca



Vanessa, Jonee, Grace and Paul underway painting their alpaca art



Chloe practising the drenching technique



Hayden and Tygh halter training

Anyone interested in meeting other young people and learning more about alpacas can email alpacayouth@gmail.com and ask for more information.

Gut Parasitism & Premature Births



By Lynn Edens - Snowmass Alpacas USA

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When a premature or unusually small cria is born on your farm, do you consider whether an undetected infection of the dam with intestinal parasites may have compromised the pregnancy?

Until relatively recently we did not think about this possibility, instead blaming the occasional premature birth on things like hot weather, other forms of stress, or bad luck. But during the very wet summer of 2020 we experienced an increase in the number of premature and weak cria births at our northern farm during a period in which we also saw an increase in adults with significant parasite infections. Our sense of a connection was further reinforced by the fact that after we had treated the remaining due dams with anthelmintics the rate of premature births declined to what we considered normal for the balance of the season.

We decided to use the 2021 cria birth season to try to collect data that would help us better understand the possible link between gut parasite infection and our birth outcomes. From that effort we learned that despite a parasite management program that appeared broadly successful we were still incurring “invisible” losses: Though our adult animals were not dying or even visibly ill, we were losing crias at birth or before as the result of gut parasite infections in their dams. In fact, it appears that gut parasite infections of pregnant dams are the cause of least 40% of our premature births and having an impact even when those infections are not resulting in other apparent symptoms in the dams. This offers us a chance to improve our results by modifying our animal care.

What We Studied

To study the impact of gut parasitism on pregnancy outcomes, we collected blood from our females at the time of the birth of their 2021 crias and looked for signs of anaemia and, if present, its source. Anaemia is a consequence of gut parasitism that scales as some function of the type, severity and/or duration of intestinal parasite infection and also has well-documented negative effects on pregnancy. Anaemia that results from blood loss, for instance to parasites, can be differentiated from other types of

anaemia because plasma protein levels are also reduced by blood loss but not by causes like iron deficiency or infection with the blood parasite *mycoplasma haemolamae*. We collected blood from 347 dams at the time of their cria's birth and recorded both packed cell volumes (PCVs) and plasma protein levels over a birthing period that started July 1, 2021 and ended September 30, 2021. We also recorded the cria's birth weight and noted if it was obviously premature (we field breed and do not have exact conception dates) and recorded its weight again at approximately one month old to calculate a daily weight gain for the first few weeks of its life. You can learn more about our data in the sidebar discussion on the last page of this article.

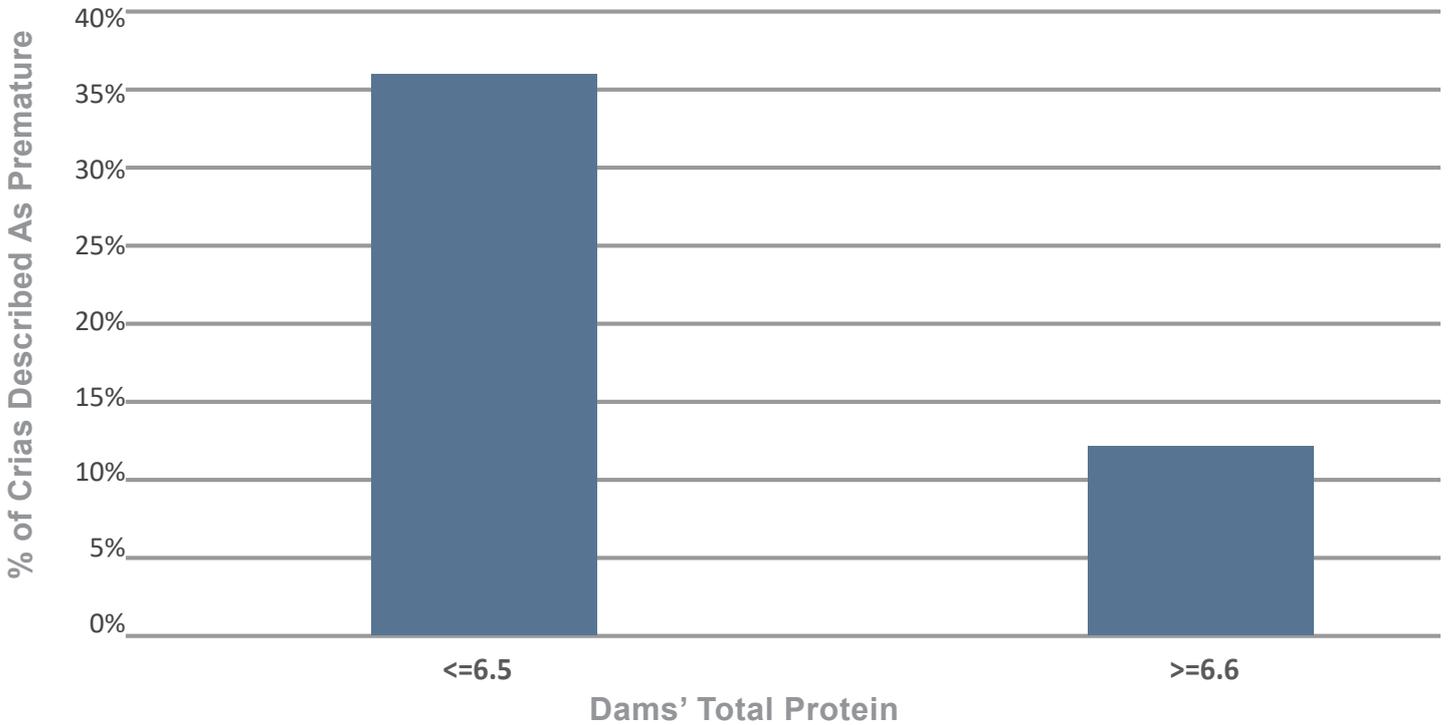
While faecal egg counts might seem like a more obvious way to assess parasite infection, there were challenges associated with measuring infection in this way. One is that an animal can be severely physically compromised by a gut parasite infection even before the worms have matured enough to begin shedding eggs, making egg counts a potentially lagging indicator of the problem we were seeking to identify and prevent. This is a particular issue for infections with *haemonchus contortus* (barber's pole worm), which is the most impactful parasite present in our animals. Another issue is that faecal egg counts are more much time and labor intensive to perform, which would have potentially reduced our sample size as these are scarce commodities in the busy birthing season.

Summary Study Results

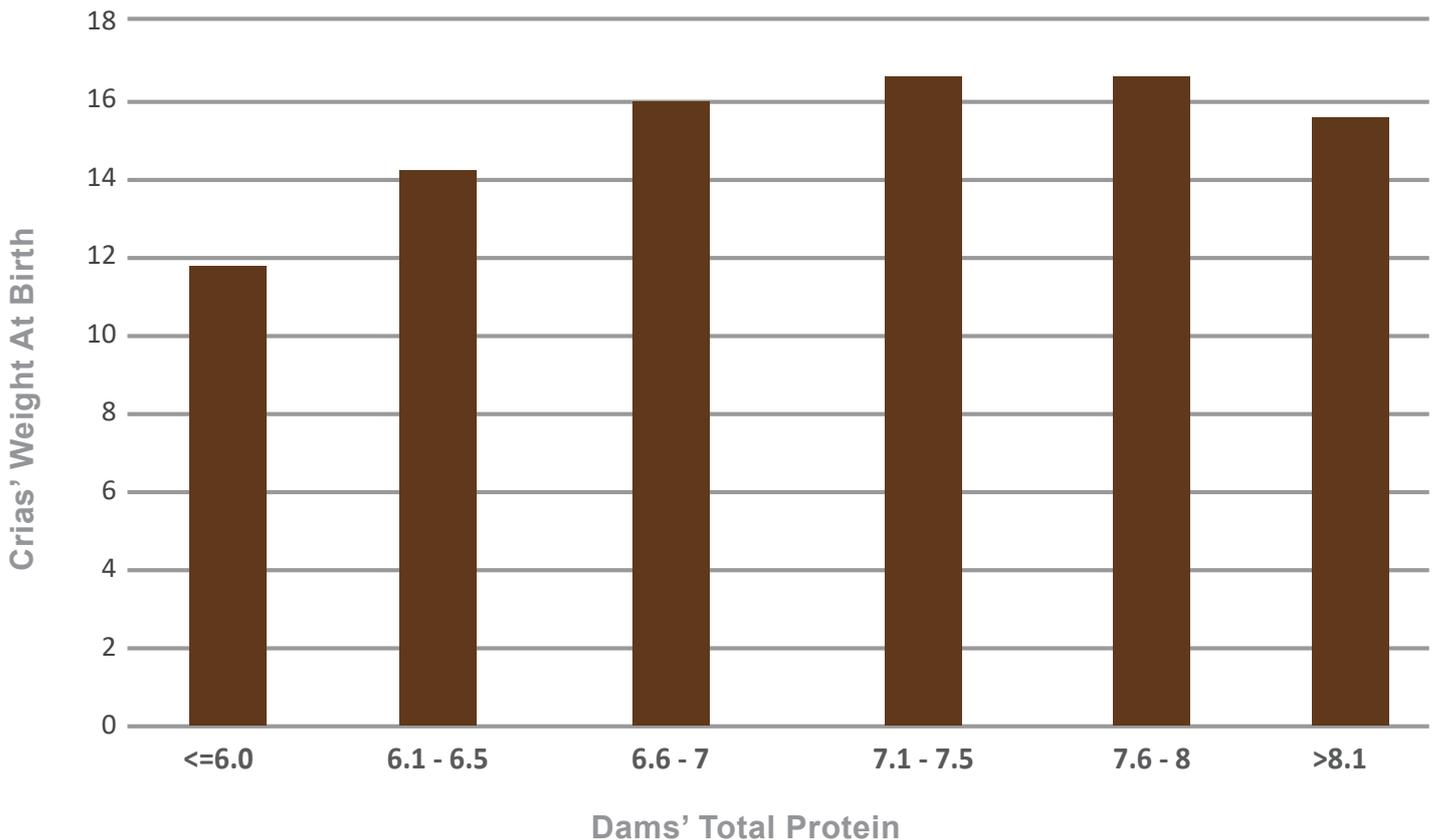
An analysis of our data suggested that gut parasites were indeed playing a negative role in the outcomes of some of our animals' pregnancies. As shown in the first graph in Figure 1, females with plasma protein levels of 6.5 or less at the time they gave birth to their crias, which usually corresponds with a significant degree of anaemia produced by blood loss, delivered crias that we identified as premature

Figure 1

Percentage of Crias With Premature Characteristics Other Than Birth Weight By Dams' Plasma Total Protein Levels



Average Newborn Cria Weights By Dams' Plasma Total Protein Levels



at three times the rate of females with higher plasma protein levels, a statistically significant difference ($p < 0.001$). The average PCV for females with plasma protein levels below 6.5 at the time of their crias' births was 23%, versus an overall average among our dams of 27%.

What's more, the average weight of crias born to females with protein levels of 6.5 or less was more than three pounds less than the average for crias born on our farm during this season (13.1 lbs versus 16.1 lbs), suggesting that the true prematurity rate in this group is higher than we are reporting based on assessments of physical maturity. As an alternative way to identify gestations shortened by gut parasite pressure, we looked at the proportion of animals born weighing more than one standard deviation less than the average of the entire group, corresponding to a birth weight of 13.0 lbs or less. The percentage of crias born weighing 13.0 lbs or less was 10% for dams with protein levels above 7.0 at the time of birth. By contrast the percentage was over five times that high for dams with protein levels of 6.5 or less (52%), a statistically significant difference ($p = 0.01$). While females with protein levels from 6.6 to 7.0 had half again as many small crias proportionately as did those of females with protein levels above 7.0, this difference was not statistically significant at our sample size.

Using Anaemia As A Marker

As previously mentioned, we choose to measure packed cell volumes and plasma protein levels for our dams because those measures presumably had some correlation with the severity and duration of a gut parasite infection, allowed us to differentiate between anaemia due to blood loss versus other causes, and could be quickly and affordably produced during a busy time on our farm. We also thought that by studying anaemia we would be looking directly at the real cause of the compromise to our dams' pregnancies.

However, our data did not support this conclusion. We found that treating our due dams with anthelmintics led to a rapid decrease in the percentage of unusually small and/or premature crias born in the following weeks, with the result that our average weekly birth weight climbed rapidly following treatment, as shown in Figure 2. Two weeks is typically not enough time for anemic animals to fully recover, and so we speculate that the rapid improvement in our pregnancy outcomes following treatment has more to do with the elimination of the parasite itself from the animals. Why would this be the case?

When an animal is infected with intestinal parasites its immune system mounts a response against them that may affect the sustainability of the pregnancy. Foetuses exert finely tuned regulatory influences over their mothers' immune systems during pregnancy. In humans, for instance, research has revealed that not only are different aspects of the mother's immune system alternatively dampened or enhanced during pregnancy, but that the specific effects vary

over the course of gestation in correspondence with the changing requirements of pregnancy. In addition, inflammatory immune responses have been linked with premature birth. The rapidity of the apparent effect of anthelmintic treatments on our preterm birth rate suggests we may be indirectly observing effects of changes in immune system functioning in our alpaca dams.

Pattern In Infection Consequences

Breeders make important tradeoffs when choosing how to manage intestinal parasite infections on their farms. Frequent herdwide treatments with deworming medicine can save a few animals in the short run but have a dire long run cost as the parasites evolve in ways that reduce the efficacy of the medication. During the summer and fall of 2021 we lost just six of approximately 1600 animals aged one or older to intestinal parasites and lost no crias to direct infection. Based on that statistic alone we saw no reason to increase the use of medication on a herd-wide basis. However, based on the analysis described above we estimate during the study period we had 12 new crias die as the result of being born prematurely as a result of their dams' gut parasite infections, as well as a perhaps a dozen others that survived only with intensive care in their first days and weeks. We looked at the demographics of the dams producing those crias to see if we could identify any important differences between them and the other dams in the herd.

We found that the dams who were both anaemia and produced crias identified as premature were almost three years older on average than a similarly anemic group of dams who delivered crias with full term characteristics. By contrast, there was no average age difference between the females who delivered prematurely and the ones that did not in the group as a whole or in the average age of anaemia dams versus non anaemia ones. We gathered from this that more severe parasite infections are more likely to compromise the pregnancies of our older females than of our younger ones, even though older dams were individually no more likely to be anaemic.

We also considered whether we could know in advance which females were likely to be more vulnerable to severe infection. Because we had previously provided blood and fecal samples taken at several points during a five-month interval from approximately 100 pregnant females for an unrelated study by a doctoral student at Tufts University, we had a chance to look and see whether the dams in that sample group that were subsequently found to be compromised by parasite infections at the time of their crias' births were more likely to have been struggling with parasites at an early stage of their pregnancies as well.

The answer was yes: There was a statistically significant positive correlation between dams' total protein levels when they delivered their crias in the summer and those they

A close-up, profile view of a white alpaca's head and neck. The alpaca has soft, white woolly fur and large, upright ears. It is wearing a light blue, quilted jacket with a dark brown or purple strap across its back. The alpaca is sitting in a nest of dry straw. The background is blurred, showing more straw and possibly other animals in a barn or enclosure.

“When an animal is infected with intestinal parasites its immune system mounts a response against them that may affect the sustainability of the pregnancy”

recorded the previous winter. Some animals are more susceptible to parasite infection than others, or less resilient when infected, or both. There are many possible reasons for this, including but not limited to age, genotype, environmental differences both past and present, differences in behavior, and differences in other aspects of physiology and general health. Whatever the cause of their susceptibility, the dams in this smaller sub-sample that had total protein levels of less than 7.0 the previous winter had crias that weighed 1.3 lbs less on average than those with higher protein levels and were about twice as likely as the larger group to give birth to an apparently premature cria.

These patterns suggest the possibility of identifying in advance a narrowly targeted subgroup of vulnerable pregnant females in a herd to receive more intensive parasite monitoring and treatment during pregnancy. Targeting only a more vulnerable group for incremental anthelmintic treatment should help preserve the efficacy of these drugs on individual farms for as long as possible while preventing some stillbirths and newborn cria losses. In addition, as another part of our study suggests, it may result in an improved rate of weight gain for the crias of the vulnerable females.

A Link With Cria Weight Gain

At the time of this writing we were still collecting data on cria growth rates, which for obvious reasons lags the data we can record at birth. But the data we did have showed a positive correlation between the total protein levels of dams at birth and the subsequent daily weight gain of their crias in the first month of their life. The crias from dams with normal protein levels grew faster on average than the crias of dams with below normal protein levels at the time of birth, both on an absolute basis and proportionately relative to their birth weights. This was true even when we looked at crias of near average size and apparent gestation from anaemic dams.

It's too soon for us to tell whether this lower average rate of growth reflects only a delay or if it signals a loss of ultimate size and stature for the affected animals, or to determine its cause. But crias that struggle to gain at an acceptable rate often impose additional direct and indirect costs on a breeding program that are independent of their final size, so this is something we will be examining more closely in our future work.

Figure 2

Weekly Average Cria Birth Weights And Levamisole Treatment Timing



Other Approaches to Gut Parasite Management

It's not just us: Livestock breeders around the world struggle to minimize parasite losses using anthelmintics to which there is increasing resistance. Treating as few animals as possible helps limit the rate at which parasites can evolve to evade the drugs but also reduces the shorter-run benefits that can be achieved by treatment, which is often an unappealing business trade off. Not surprisingly, a lot of research effort has been focused on finding better alternatives. We recently had the opportunity to speak to Dr. Don Bliss of MidAmerica Ag Research regarding a strategic deworming protocol developed for camelids based on research conducted by the pharmaceutical company Merck. This program excited us because it uses a sequence of dewormers in a series timed to activate encysted *haemonchus contortus* (which can be present in the animal not just in the winter at but other times as well) so that it can be eliminated by the second dewormer, offering a way to target a parasite population that can't be otherwise eliminated with medicine, pasture cleaning and other efforts.

Another treatment that has been demonstrated to be effective at reducing gut parasite infections in sheep and goats involves the use of copper oxide wire particles. Copper oxide is a slow release form of copper that helps mitigate toxicity - even sheep can be treated with it safely. Research suggests it is as effective as Levamisole for reducing *haemonchus contortus* and gastrointestinal nematode infections, and copper oxide wire particles have also been shown to work synergistically with other anthelmintics. Not surprisingly, it has yet to be thoroughly studied in alpacas as far as we have been able to determine. We hope to find a researcher interested in documenting the safety and effectiveness of this treatment in alpacas in the months ahead.

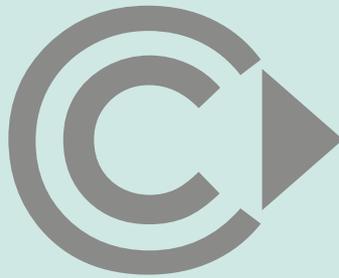


OUR DATA

During the period between June 1 and September 30, 2021 we collected blood samples from 347 dams at our Canastota and North Salem farms, most within 24-48 hours after they had given birth to their 2021 crias. Using a hematocrit centrifuge and a refractometer, we recorded packed cell volumes (PCVs) and plasma total protein levels for each dam. Our PCV and protein results were positively correlated: Animals with low PCVs were also more likely to have low protein levels ($P < 0.001$). This would not be the case for animals that were anaemia due to a nutritional deficiency (in particular, of iron) or as the result of infection with the blood parasite *mycoplasma haemolamae*. As a result, we concluded that blood loss was the most typical cause of the anaemia some of our dams were experiencing. We knew from long experience the most likely cause of blood loss in our animals was infection with *haemonchus contortus*.

We had expected to see the average PCV and protein level decrease as the birth season wore on because the females giving birth later in the season had experienced a longer period of favourable transmission conditions for the parasites. While the average PCV of our dams giving birth did decline modestly from June to August (and then increased in September), average protein levels climbed gradually throughout the season. This may have been because the extremely wet weather conditions (it was the rainiest summer ever recorded in both our farms' locations) and optimal parasite transmission conditions forced us to deworm our pregnant females in both July and August this year, the first time we have dewormed our animals twice in one birthing season. However, even with the treatments provided the standard deviation of both the PCV and protein results did climb from June to August. In other words, we began to see more variation between our individual females' results.

There are many factors which can influence a cria's weight at birth or whether it is born prematurely. For instance, we have previously established that on our farms, maiden females' first crias weigh less on average than those of proven dams. Sometimes pregnant dams get sick, deliver prematurely and/or abort for other reasons: For instance, at our North Salem farm, we had a surge in stillbirths around the time we were enduring repeated bouts of severe weather from tropical storms that we thought might be due to *Listeria* infection. The links between anemia and/or low protein levels in dams and the birth weights and apparent gestational maturity had to be significant enough to be detectable in the resulting "noisy" data. And they were. Both protein levels and PCVs were individually correlated with birth weights in our data set, and the correlations were statistically significant ($p < 0.001$ and $p = 0.03$, respectively.) Protein levels share a slightly closer relationship with cria birth weights than do PCVs, suggesting that when causes other than blood loss have produced anaemia in our dams, those causes may have less of an impact on those females' pregnancies.



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