

Rickets in alpacas

(from Tanya Mudge)

Rickets, or hypophosphatemia, is a major cause of non-infectious disease in alpacas and is also likely to be the major cause of death in breeding age females. It is a painful arthritic condition caused by a Vitamin D, phosphorous or calcium deficiency or all of the above. Alpacas in the southern hemisphere are at risk of Vit D deficiency during winter and early spring. Vit D is needed to maintain calcium and phosphorous utilisation in the body, which in turn are needed for proper skeletal growth and maintenance. It is synthesised in the skin, as a result of solar radiation, and is likely to be reduced in winter months, especially in the western Cape, as a result of the lack of sunlight.

It seems that alpacas have higher Vit D requirements compared to ruminants, and this may be due to them being adapted to the very high UV exposure in their native environment.

Causes:

- Low levels of ultraviolet light (sunlight):
 - the further away you get from the equator
 - from being kept indoors
 - being physically covered up with jackets
 - denser fleeces
 - darker pigmented animals
- Lush grass pastures:
 - Vit D also comes from consumption of sun cured dried foods like hay. Lush grass diet limits production of Vit D.
 - Lush pastures have high levels of carotenes which tie up Vit D, making it less available to the body.
- Lucerne and grains are higher in calcium than the ideal ratio. Hay to lucerne ratio should be at least 3:1. Grains are deficient in calcium and phosphorous.

Symptoms:

The symptoms in older animals are more subtle and when recognised, it may be too late to save the animal. The highest death rates occur in late pregnant and nursing females. By the time rickets is well established, there could be other issues such as a heavy worm burden, coccidian and other problems. If these issues, and not rickets, are seen as the cause, and treatment is only directed at them, the animal is more likely to die because the underlying cause of the problem goes unrecognised and untreated.

Normally the animal does not lose its appetite or have the scours and has a normal temperature. Adults will normally not have crooked legs. The symptoms in italics below are the best way to tell relatively early if an animal, especially an adult, has rickets.

- Painful to walk – doesn't run, stiff gait, *always at the back of the herd*
- *Shifting lameness* – from one leg to the other

- *Long periods cushing* – grazes less than others, grazing while cushing as normally still has an appetite
- *Inability to stand on back legs*
- *Humped back posture*



Photo: Elizabeth Paul

- *Weight loss* and decreased growth rates even though eating well
- Kneeds the ground before cushing – lifts front legs up and down alternatively a few times before cushing
- Deviation of the front and hind legs – only severe cases or in young crias.



Photo: www.shagbarkridge.com

- Enlargement of the knee joints
- Increase in bone fractures
- Anaemia or low red blood cell count as the cells burst when phosphorous levels are very low. Animals with anaemia will have pale eye and mouth membranes. Anaemia associated with rickets is caused by a phosphate deficiency, not an iron deficiency.
- Extreme form - death

Diagnosis:

Blood (serum) phosphorous levels fall sooner than the calcium levels. Test blood phosphorous and calcium levels – easier and cheaper than testing Vit D. The natural ratio of Ca:P is 2:1, although 1.5:1 is closer to the ideal in alpacas. Vit D is essential for maintaining this balance correctly. Without adequate Vit D levels, very little

phosphorous will be absorbed. The serum level of P should be above 1.5mmol/L. Levels of above 2.0 mmol/L are preferred in adults.

In crias less than 6 months old, normal P is 6.5-9.0 mg/dL and Vit D is >25 to 50 nMol/L. The levels below would be diagnostic for rickets in this age group:

- Serum phosphorous of <3.0 mg/dL
- Ca:P ratio of >3:1
- Vit D concentrations of <15 nmol/L

Below are the Ca:P values of my animals that have had rickets:

2.17 : 0.83 mmol/L (4 month old male – severe case)

2.15 : 1.54 mmol/L (adult female – borderline values, but rickets was present)

Other factors which can affect serum phosphorous levels:

Age - levels are highest when young and rapidly decline until about 12 mths of age at which time they should remain constant.

Pregnancy and lactation - lower levels as phosphorous lost in milk and being used to form the skeleton of the developing cria.

Season - higher levels in late spring and summer months due to increase in sunlight.

Digestive upsets - e.g. Diarrhoea cause low serum levels because of decreased absorption from the diet and losses into the gut. Worm burdens also cause lower serum levels of phosphorous.

Kidney failure - May show as high phosphorous levels as the kidney cannot remove phosphorous from the bloodstream for excretion in the urine.

Those more prone to rickets:

- Animals under stress
- Crias born in autumn and winter, esp. at 3-6 months old - milk is especially devoid of Vit D
- Growing animals
- Pregnant / lactating females
- Animals with a darker skin or denser fleece - blocking UV light
- Those who have had it before.
- Animals not sufficiently exposed to UV light
- There may be a genetic influence with some animals being better able to manufacture their own Vit D than others. My two most dense females are mother and daughter and are both prone to rickets.
- Whethers can get it too.

Preventative treatment:

Crias:

A single injection of 1000 IU Vitamin D3 per kg body weight in late autumn maintains crias for up to 7 weeks. A second injection is needed in mid-winter (after 7 weeks) to maintain Vit D status. Crias born in autumn and winter do not have the opportunity to build up Vit D reserves in summer and autumn.

Adults:

A single injection in late autumn of 1000 - 2000 IU Vitamin D per kg body weight to late pregnant / nursing females, animals under 2 yrs old (still growing) and animals prone to rickets should prevent Vit D deficiency in older animals.

Dose any animals two months later again if they look like they may be developing rickets.

Supplement heavy pregnant females due to give birth in late winter 4 – 6 weeks prior to birth to ensure adequate colostral levels of Vit D for the cria.

Refined rock or mineral phosphate, called di-calcium phosphate (DCP) is a fluffy white powder and is safe to use as a feed additive. Do not use bonemeal as an additive as there is a risk of transmitting other diseases. Phosphate fertiliser could poison alpacas.

Specific treatment:

The treatment below was prescribed to me by an overseas alpaca vet. I have used this a few times and have seen no negative side effects. However, I cannot take responsibility for any that may occur.

- Finadyne for pain
- 2000 - 3000 IU/kg Vitamin D - treatment dose only, not preventative dose
- Catasol (Phosphorous) for 5 days - treatment dose only, not preventative dose

Only treating with Vit D or phosphorous is not enough. Both must be used. Be careful not to overdose with Vit D, as it can cause toxicity problems. Many Vit D injectables come in the form of Vit ADE. Be aware that too much Vit A is also detrimental. Using a pure Vit D3 would be best.

The affected animal should be walking better after about a week, depending on the severity of the condition. If possible, shear as soon you can, so that the sunlight can reach their skin. Obviously this is normally not practical because rickets occurs in the cold autumn / winter months.

Please refer to the articles below before treatment if you think an animal has rickets.

References:

Personal experience

McNeil, J. Phosphorous, Calcium & Vitamin D – “The 3 Amigo’s”

Van Saun, R.J. Vitamin D Rickets: Diagnosis, Treatment and Prevention.

Paul, E. Rickets: A Snapshot.

Primary Industries and Resources SA. Alpacas – management & health. (www.pir.sa.gov.au/factsheets)

Cooper, N. Vitamin D. (Southern Alpacas Stud website)

Whitehead, C.E. Information sheet: Vitamin D supplementation. (www.ukalpacavet.com)

Australian Alpaca Association. Husbandry: Mineral & Vitamin supplements – fact sheet)

Purdy, S.R. Practical Llama and Alpaca Nutrition.