Animal & Plant Health Agency

APHA Miscellaneous Exotic and Farmed Species (MEFS) Expert Group

Veterinary Information Sheet:
South American Camelids

The South American or New World Camelids comprise the four species Llama (*Lama glama*), Alpaca (*Lama pacos*), Guanaco (*Lama guanicoe*), and Vicuña (*Vicigna vicugna*), originating from the Altiplano in west-central South America.

Alpacas and llamas exist only as domestic species, descended from the wild vicuña and guanaco respectively. In the UK, alpacas are kept as producers of high-quality fibre, as companion animals and for trekking. Bred for strength and size, llamas are commonly used for 'guarding' sheep flocks and trekking. The British Alpaca Association represents 45,000 alpacas across the UK while the British Llama Society represents between 2,000 to 4,000 llamas, kept mostly as pets (BAS 2023, BLS 2023). However, these numbers probably underrepresent the actual number of UK alpaca and llama populations, as likely not every holding is a registered member of either association.

Two breed types of llama are recognised, the woolly-necked tampuli, and the larger ccara with short to medium coat length which is most commonly seen in the UK. There are also two types of alpaca: the huacaya with 'teddy bear' appearance due to its short, crimped, perpendicular fibre, and the suri whose crimpless, long coat hangs in 'pencils'. Most alpacas in the UK are of the huacaya type. A wide range of solid and multicolour or 'paint' varieties of both alpaca and llama are recognised.

General biology

Characteristics	Alpaca	Llama
Bodyweight Adults (kg)	55-90	113-250
Bodyweight Newborn (kg)	6-9	8-18
Life expectancy (years)	15-25	15-29
Resting body temperature	37.5-38.9°C; (99.5-102°F)	
Resting heart rate	60-90/min	
Resting respiratory rate	10-30/min	
Gastrointestinal sounds	3-5 C1 contractions/min	
Gestation length	Approx. 342 days	
Feeding	Grazer	Grazer and browser

The alimentary tract

South American Camelids (SACs) have a three compartmented stomach which often leads to them being referred to as pseudoruminants. The stomachs are known as compartments 1 to 3 (C1, C2, C3). In adults C1 occupies much of the left abdomen like the rumen, with functionally similar fermentation by bacterial and protozoal populations. However, there are several anatomic and functional adaptations which give SACs an advantage in digesting poor quality forages, which are common in their native environment. C1/C2 differ to the rumen as they lack papillae, have adapted glandular saccules in the ventral portions, and a narrow C2/C3 opening. These anatomical features in combination with longer retention times and enhanced motility mean better mixing and fermentation of feed to produce homogenised contents, rather than discrete layers of liquid and fibre mat as seen in the rumen. Contractions are typically quieter than in ruminants. SACs also have enhanced urea recycling to overcome a naturally low protein diet and can rapidly absorb volatile fatty acids. All these adaptations enable enhanced extraction of nutrients from poorer quality feeds compared to other ruminant species. C3 has glandular and non-glandular regions and is susceptible to ulceration, particularly in the distal acid-secreting portion, and these ulcers can perforate. Distal to the stomachs, SACs have a comparably shorter small intestine than ruminants, and a longer large intestine for efficient reabsorption of water. The caecum is small and vestigial. Faeces are voided in pellet form in communal dung piles. The behavioural response to colic is more like that of equids than of ruminants.

Metabolism

In their natural habitat, the diet of SACs is largely comprised of poorly digestible fermentable fibre. Cellulolytic bacteria in C1 required to break down this fibre depend on ammonia. As the diet itself is low in protein, SACs have adapted to efficiently recycle urea back to the saliva to re-feed these C1 microbes, in addition to having higher urease activity in C1. It has also

been proposed that they utilise substantial amino acids for hepatic gluconeogenesis, which may explain higher resting blood urea nitrogen (BUN) and their ability to produce adequate glucose in the face of a low sugar/starch diet.
The need for fat storage when times are plentiful, and quick mobilisation when there is famine, likely explains why SACs are naturally insulin resistant. This means they also respond poorly to increases in blood glucose and have a high resting blood glucose (5.1-9.1 mmol/l in alpacas) which can be exacerbated by stress. In states of negative energy balance, body fat is readily mobilised in the form of non-esterified fatty acids (NEFAs) for hepatic ketogenesis. SACs are not typically ketogenic and ß-hydroxybutyrate (BHB) levels may remain low even in a significant energy deficit, therefore, increases in BHB are always significant. Due to these adaptations, however, SACs are more susceptible to hepatic lipidosis.

Oxygen-carrying capacity

Being from a high-altitude environment, SACs are well-adapted to low oxygen. They have small, thin, elliptical red blood cells with a high surface area, high mean corpuscular haemoglobin, and high oxygen saturation and dissociation from haemoglobin. This means SACs can withstand profound anaemia without demonstrating clinical signs, until the packed cell volume is as low as 3-4%. Similarly, they can appear well with very little functioning lung tissue, as can be seen in cases of advanced tuberculosis.

Reproduction

Male alpacas typically reach full sexual maturity around 2.5-3 years of age, though as this largely depends on detachment of the penis-prepuce adhesion, younger males may be capable of impregnating a female. Young female alpacas usually reach sexual maturity around 12-14 months of age, though first mating may be delayed to 18-24 months. SACs have repetitive cycles with a follicular phase and luteal phase but do not have a regular oestrus cycle and they are induced ovulators. During mating, semen is deposited through the cervix directly into the uterine horns. Once pregnant, lack of receptivity of the female to the male, referred to as “spitting off”, is the most supportive indicator of early pregnancy, with transabdominal ultrasound scanning effective from approximately 45 days of gestation. Maintenance of pregnancy relies on progesterone secretion from the corpus luteum throughout gestation. The placenta is diffuse, epithelio-chorial, and microcotyledonary like the sow and mare, but offspring, known as cria, are born within an extra foetal membrane unique to camelids. The epidermal membrane covers the body, head, neck, and limbs, and is attached at the mucocutaneous junctions. It is much more friable than the amnion and quickly withers away after parturition, which is an important feature as licking and stimulation by the dam is less frequent than in other species. Cria should be seen standing within an hour of birth. The placenta should be expelled within 4-6 hours and the cria should pass meconium within 24 hours.

Routine practices in managing alpacas

- Weaning – usually at six months at a minimum body weight of 25 kg (35-45kg ideal)
- Castration – usually between 12-18 months
- Shearing – usually once a year in the summer months
- Endoparasite control*
- Vaccination* – typically a multivalent clostridial vaccine
- Vitamin D supplementation* – injectable and paste products
- Zinc supplementation* – typically available as in-feed products

***At the time of writing, no licensed products for SACs are available in the UK. Products can only be prescribed by a licensed veterinary surgeon under the cascade.**

Additional sources of information:

Textbooks

Fowler, M.E. (2010) *Medicine & Surgery of South American Camelids*, 3rd ed., Iowa: Wiley-Blackwell.
Cebra, C., Anderson, D.E., Tibary, A., Van Saun, R.J., Johnson, L.W. (2014) *Llama and Alpaca Care: Medicine, Surgery, Reproduction, Nutrition, and Herd Health,* St Louis: Elsevier.

Articles

Anderson, D.E., Whitehead, C.E. (2009) ‘Alpaca & Llama Health Management’, *Veterinary Clinics of North America: Food Animal Practice,* 25(2), 266-277.
Foster, A., Bidewell, C., Barnett, J., Sayers, R. (2009) ‘Haematology and biochemistry in alpacas and llamas’, *In Practice,* 31, 276-281.
Van Saun, R.J. (2006) ‘Nutritional diseases of South American Camelids’, *Small Ruminant Research*, 61, 153-164.
Waitt, L.H., Cebra, C.K. (2002) ‘Characterization of hypertriglyceridemia and response to treatment with insulin in llamas and alpacas: 31 cases (1995–2005)’, *Journal of the American Veterinary Medical Association,* 232(9), 1362-1367.

Websites

British Veterinary Camelid Society: www.camelidvets.org
British Alpaca Society: Home - The British Alpaca Society (bas-uk.com)
British Llama Society: British Llama Society