ALPACA MEDICINE PART TWO: PRACTICAL POINTS

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Nigel Dougherty focuses on alpaca nutrition and feed, highlighting target weights, and reproduction in the final article of this two-part series

THE camelid digestive system cannot be considered analogous to ruminants, despite sharing some similarities with true ruminants and even though the small and large intestines also do not have fermentory function.

Nutrition

Camelids have a slower passage of particulate feed through the stomach than true ruminants, which allows for more complete digestion and greater nutrient extraction from given diets. Camelids also eat less – an estimated daily dry matter (DM) intake of one per cent to 1.5 per cent of their bodyweight (BW) compared to two per cent to three per cent for cattle and sheep. Their energy requirements are 63 per cent to 85 per cent that of sheep, yet they eat 50 per cent to 70 per cent as much per unit BW. adult, nonpregnant females average 65kg to 70kg. Protein requirements (10 per cent to 14 per cent DM) are lower compared with sheep and cattle, partly because alpacas are efficient recyclers of urea.

For maintenance of adult female body condition, eight per cent to 10 per cent of DM daily intake must be crude protein. During late (last trimester) pregnancy and during lactation, intake increases to two per cent to 2.5 per cent of BW/day and crude protein requirements increase to 12 per cent and 16 per cent respectively.

Crude fibre levels must be 25 per cent (on a DM basis) for normal functioning of the digestive

system (and at least 50 per cent of stubble length of hay should exceed 40cm) to provide balance. Hence, if animals are on lush young grass, hay must be added to their diet. By simple simultaneous equations, balanced rations can be devised using a mix of good quality hay, oats, lupins or lucerne hay. Common imbalances include too low fibre levels, especially in spring and autumn, leading to loose faeces and possible loss of condition, and excesses of protein that are often simultaneous with low fibre, especially spring grass, which can be greater than 30 per cent protein.

Excessive amounts of lucerne may upset calcium/phosphorous balance, especially during the first year of a cria's life when bone development is so crucial. Excesses of lucerne in adults may put unwanted weight on alpacas.

Alpacas are at much lower risk of developing metabolic disorders during pregnancy and lactation than cattle or sheep. Cattle have a high demand for sugar supplied by the liver, especially during pregnancy/lactation, hence rumen volatile fatty acids (Vfa) production needs to be shifted from acetate towards proprionate.

The camelid liver, however, is constantly making sugar and this is possibly driven more by protein than by proprionate – so bovine strategies to enhance sugar production are unnecessary or even harmful in camelids. Camelids are at risk of developing acidosis and the development of gastric ulceration with the use of grains, perhaps due to slow stomach emptying and slower passage. Grains or pellets should never exceed 50 per cent of diet (and ideally be a good deal less) and they should be introduced very gradually over a month. Pellets (such as those used for training purposes) should preferentially be lucerne-based, not grain-based.

Alpaca faeces should be pelleted, hard and dry. Diarrhoea beyond the neonate age is uncommon in alpacas and important differentials to be considered are parasitism (especially if recently weaned) and, occasionally, coccidiosis (if three weeks of age or older). in adults, Johne's disease (*Mycobacterium avium paratuberculosis*) can be a serious issue, but only really under intensively managed, heavily-stocked situations.

Clinical bases for nutritional assessments are similar to other species. in order of importance: body condition scoring; feed analyses (establish these if your client hasn't already); growth rates (and good recordkeeping); faecal consistencies (as well as faecal egg counts where appropriate); and reproductive performance.

Body condition scoring deserves the most mention. Key places are the dorsal spinous processes of the withers (midthoracic – all the way back to the hips), the fibreless area behind the elbow, the "keel" of the chest and the perineum.

Key target condition scores (on a scale of one as emaciated to five as obese) are as follows:

• stud males: three;

• wethers: 2.5 to three;

• growing crias: 2.5 to three;

• females at “unpacking”: three (min) to 3.5 (max); and

• females in and at end of lactation: 2.5 (min).

Target alpaca weights might be as follows:

• cria at birth: 6kg to8 kg (if less than 5.5kg, will be like an at-risk foal);

• cria at four weeks: 15kg to 18kg;

• cria at six months: 30kg to 40kg;

• mature female: greater than 50kg, usually 60kg to 70kg; and

• mature male: 70kg to 90kg.

Toxicity manifestations and important toxic agents are similar to ruminants. Alpacas are, however, considered as “sentinel” species for ryegrass staggers (but they do respond well to removal from ryegrass and, possibly, vitamin B1 supplementation) and, particularly, sporidesmin-based facial excema. Alpacas seem to be less sentinel for copper deficiencies than cattle, but seleniumvitamin E deficiencies can quickly become of clinical significance, particularly when increased incidences of poor cria viability, classic white muscle disease and placental retentions are encountered.

Reproduction: male

Male alpacas can become sexually active from eight months of age and, although spermatogenesis normally takes place at an older age, males should be separated from females at or prior to eight months. Males intended for stud use should not be used before breakdown occurs of the preputial attachment to the penis (which usually will have taken place by 36 months). Failure to respect this requirement might lead to impotentia coeundi in the future so it’s best not to use a male before two-and-a-half years of age.

The eruption of the alpaca’s fighting teeth is a good indication of when penile adhesion breakdown has happened. As a general rule eight per cent to 12 per cent of males will have broken down adhesions by 12 months of age, 70 per cent to 78 per cent by 24 months and 100 per cent by 36 months. Males shouldn’t be overused for services or else conception rates will be affected.

Testicular size is a very good indicator of likely sire performance and, ideally, only males with testicles of greater than 30mm diameter should be considered for stud services.

Castration is a commonly performed procedure and it can be done at over eight months of age. It can be left until two years of age, but early castration (12 to 18 months) does not have contraindications. For alpacas, a standing castration, performed with one operator holding the neck and another “propping” up the abdomen, is perfectly satisfactory. If necessary, 0.35ml of butorphic and 0.1ml of 10 per cent acepromazine can be given IM as a light sedative. Following local scrotal (4ml to 5ml) and intra-testicular (1ml) application of lidocaine, each testis is exteriorised within its common tunic (closed-technique), excess fat is pared off with a dry swab and the cord and vessels clamped and ligated. The wound is left to heal as an open wound, ensuring sufficient drainage.

Often, owners will ask for fighting teeth to be filed in stud males. Just as with the filing of incisors, this is best done with a slow-speed rotary tool or an equine dental powerfloat. Sedation is best – I use “half” the “standard” triple combo IM dose – for these procedures.

Reproduction: female

Females should only be bred when they reach at least 50kg, or at or more than two-thirds of their mature weight.

The two most common reproduction-associated problems vets will be called for are “repeat breeders” and dystocias. The basis for understanding female alpaca reproduction is that they are induced ovulators (most usually) whose subsequent hormonal physiology, from a practical point of view, can be compared to the bovine cycle. Female alpacas do not “come on heat”, but instead show prolonged periods of sexual receptivity due to overlapping waves of follicular development and regression.

This periodic receptivity outwardly appears to resemble oestrus, but the control of follicular dynamics differs from that of cattle. There may be intermittent periods of non-receptivity of one to two days duration as new follicular waves commence, but this is of little practical significance. It is the act of copulation that (most usually) provides the hormonal (gonadotropin-releasing hormone/ luteinising hormone) positive feedback for ovulation and the subsequent development of a corpus luteum (CL). CLs developing from a mature (but not “aged”) follicle usually remain functional for 10 to 13 days.

If the female is mated when a follicle is regressing she will not ovulate, but the follicle will become luteinised. The luteinised follicle will produce progesterone, but this will only occur for approximately half the time a normal corpus luteum would secrete progesterone, for example five to six days compared with 10 to 13 days.

If mating doesn’t occur, the dominant follicle will remain for two to eight days and regress over the

next three to five days. Ovulations are generally single; multiple ovulations occur in 10 per cent of natural matings, but twin births are extremely rare. Alpacas are non-seasonal breeders with an amazing capacity for uterine involution and are best mated 14 to 28 days postpartum because of an inverse relationship between conception rates and the number of cycles postpartum.

From a practical point of view, the significance of such physiology is as follows.

• Spit-offs, as female rejections are known, are a useful way of seeing if a corpus luteum is present (a very indirect method of pregnancy testing).

• Spit-offs after seven days ascertain whether ovulation has taken place. If the female spits off, ovulation has taken place and pregnancy is possible. If not, she has probably not ovulated and warrants re-mating.

• Spit-offs at 14 days allow determination of whether those spitting off at seven days have recognised pregnancy. If they are positive again, they are most probably pregnant (but could have a retained CL), but should be tested again at day 28. This is important because of the reasonably high prevalence of embryonic loss in alpacas.

• Twins are extremely rare; either one twin is resorbed or the twinning process leads to foetal loss of both twins.

Ultrasound scanning is as important as spit-off testing. Scanning can be done rectally (7.5 MHz linear probe) at day 30 and again, per flank, at day 60 and 120. It would be unwise to guarantee a pregnancy prior to day 60 due to the relatively high prevalence of early foetal losses. Flank scanning from 60 days onwards is preferred because it is much less invasive. Manual rectal palpation should only ever be performed by persons with a size-six glove (or less) and, even then, with the very greatest of care given the risks involved. Proper restraint, by chukkering, is mandatory for rectal scanning and the rectum should be filled with lubricant using an obstetric syringe prior to probe entry. It may be necessary to reduce the amount of stiffness of probes that have been prepared for cattle, so as to reduce their circumference, and the probe end must be blunted. Some per-rectal distance landmarks and measurements are as follows:

• 15cm vulva to cervix;

• 30cm vulva to ovaries;

• cervix circa 3cm long;

• uterine horns circa 8cm long;

• uterine body circa 3cm long;

• ovaries peanut sized;

• follicles must be between 7mm and 12mm for ovulation to occur; and

• follicular cysts are cysts greater than 12mm on ultrasound.

Aetiological work-up of the problem breeder, as with all other species, depends as much on good owner vigilance and record keeping as it does on clinical intuition and skill in physical and obstetric examination. In many cases, the causes are simply management-based. Perhaps the most common clinical cause is due to uterine infection, where the presenting complaint is usually a female who sits to be mated every two weeks, but fails to conceive – especially one whose previous birthing was assisted or incurred complications. Vaginal speculum and ultrasound assessments may help with such a diagnosis. A suggested treatment plan, especially for pyometritic (but also for suspect endometritic) cases is as follows:

• day one: cloprostenol sodium 0.1ml/kg + 15IU oxytocin (IM) + 25,000IU benzylpenicillin (or alternatively, 2.2 mg/kg of ceftiofur given IM);

• day two: cloprostenol sodium 0.0.8ml/kg + 15IU oxytocin (IM) + 25,000IU benzylpenicillin (or alternatively, 2.2 mg/kg of ceftiofur given IM);

• days three and four: + 25,000IU benzylpenicillin (or alternatively, 2.2 mg/kg of ceftiofur given IM).

A word of warning: never use lutalyse (that is, dinoprost, the naturally occurring prostaglandin) and only use estrumate, or oestroplan flexi (a synthetic PGF2? analogue) and make sure prostaglandin is never given intravascularly.

Hyploplastic ovaries are another common cause of infertility in alpacas and they tend to present as cases that sit rather than spit off every seven days, without ever really showing particularly overt signs of spitting off. In older females (older than two years of age), suspect cases require an ovarian stimulation test using a luteinising hormone. The protocol is beyond the scope of this text.

Retained foetal membranes should be treated with promptness (intervene if six hours-plus), as with a horse and recourse should be made to the use of 15IU oxytocin (except it must be given IM) every six hours for up to 24 hours, rather than primarily manual traction – in which extreme care must be exercised. The placenta should be examined in exactly the same manner as would be done with a horse (and its expected appearance is effectively the same). Retained tags require rigorous uterine flushing with copious amounts of saline, and a cephapirin injector can be applied afterwards. Never use tetracycline-based intrauterine pessaries in alpacas.

The principles of dystocia management are effectively no different to that of cattle. Alpacas should, however, give birth in the daylight hours of the morning. If not, then suspect a problem and strongly

advise a veterinary visit (as the saying goes, never let the sun go down on an unpacking alpaca, nor let things drag on into the afternoon). Use of duphaspasmin or planipart is of very limited value in alpacas. Coxocaudal epidural is useful, giving a maximum of 1.0ml of two per cent lidocaine using an 18G, oneinch needle, as per the technique used in cattle.

Care needs to be exercised to avoid uterine tearing (the uterus and uterine arteries feel surprisingly thin) and true breaches almost certainly should be resolved by caesarian section. Left flank approaches are most suitable for caesarean, under a combination of some sedation (as previously described) and diluted infiltration anaesthesia (as previously described), ideally under theatre conditions.

No attempt should ever be made to evacuate foetal membranes through the uterine incision – they should be replaced in utero and left to come out of their own accord.

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• Note: alpaca owners must be informed that none of the medications listed in this series of articles are licensed for use in South American camelids and their use should only be with informed consent.

FURTHER READING

- Fowler M (2010). *Medicine and Surgery of Camelids*, Wiley-Blackwell, Hoboken, New Jersey. This is the classic comprehensive text on camelids for the veterinarian.
- Aitken P (2006). *Alpacas: A Basic Veterinary Reference*, VetLearn, Massey University, Palmerston North, New Zealand. This is a first class and highly recommended introductory and practical reference to alpacas for the general practitioner.
- McMillan E and Jinks C (2005). *ABC For Alpaca Owners: Antenatal, Birthing and Cria Care*, Alpaca Publications, Australia. An excellent practical guide, with key indices, to help with the management of this often intensive aspect of alpaca husbandry.
- Anderson D, Smith R and Whitehead C (2009). Alpaca and Llama Health Management. In Anderson D and Whitehead C (eds) *Food Animal Practice*, Veterinary Clinics of North America. All are eminent professionals in the field and Prof Anderson is perhaps one of the most well-known authorities on the medicine of South American Camelids. Some of the information contained in this article is gained from attending a practical CPD session, in New Zealand, led by him.