What to expect when your alpaca is expecting.

Neonatal Clinic

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Table of Contents

Getting Ready.....

What you should do prior to the birth

Everyone, eagerly or apprehensively, anticipates the day of birth. But preparation for that exciting event really begins months before the 'big day'. Since this class focuses on the birth of the neonate, we will assume that the task of getting the dam pregnant (reproductive exams, breeding, etc.) has already been accomplished. Rather, we will turn our attention to the time period stretching from the last trimester of pregnancy, through the birth and into the first few days of life for the cria.

Preparing The Dam: Know the dam's history

Preparing your alpaca to give birth begins by first having a good understanding of your animal. A detailed history of the dam is not always available, but gathering as much information as you can about her is always helpful. Not having a history does not prevent her from giving birth, but knowing as much about her as you can might help ease your mind and make the unexpected a little less stressful.

Important questions to ask include but are not limited to:

- Has she had a history of uterine torsions?
- Has she had a history of uterine infections or c-sections?
- Has she had dystocia in the past? If so, what kind?
- Has she prolapsed her uterus in the past?
- Has she had any still born, weak or deformed crias?
- Has she had a history of agalactia (little or no milk) or mastitis?
- What size of crias has she had in the past?
- What has her typical gestation period been? Early? Late?

These questions also give you guidance about the information you should be collecting for your own herd files and medical records. Obviously none of these questions can be answered about maiden females. They can however be asked about the dams of those maidens. That information can prove valuable as some traits appear to be passed along the maternal line.

History can repeat itself, but is never guaranteed to do so, so the answers to these questions (in and of themselves) do not predict how a birth will go. They are worth knowing and worth discussing with your veterinarian because they will shape the way that both parties approach a pregnancy. For example, if a dam is known to have a history of uterine torsions, she will be an animal that I plan to rectally palpate sooner and more often then I normally do if she shows signs of distress.

Preparing The Dam: Assess the dam's health

In general, healthy moms produce healthy babies. There are always exceptions, but overall the best means of creating strong, healthy crias is to maintain strong, healthy dams. Skinny mothers may raise crias successfully but often only by compromising their own health. Obesity brings its own set of issues including crowding of the fetus in utero by abdominal fat and decrease in milk production due to the infiltration of the mammary gland with fat.

One of the simplest and 'handiest' means of assessing the health of your dams is to body score them frequently. My recommendation is for you to handle your dams at least once a month during the first two trimesters of pregnancy, doing general overall health exams (check teeth, toes, skin etc) and body condition score (BCS) them during that exam. Fiber can be misleading particularly in heavily fleeced animals so never rely on appearances alone....always use your eyes **and** your hands.

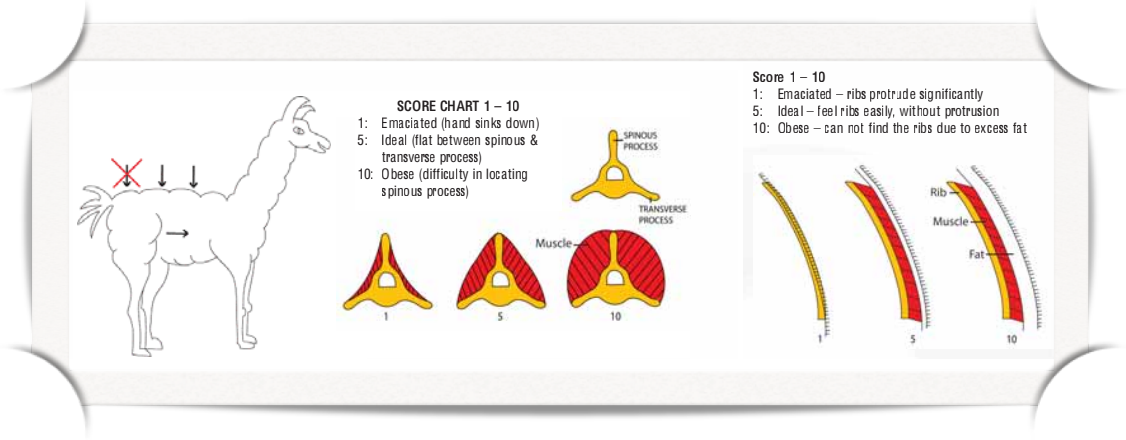
During the last trimester of pregnancy the cria will double to quadruple in size depending on the structures measured, all while the mother's weight typically records minimal but consistent increases. Any drop in body condition in the mother during this last trimester of pregnancy is important so I recommend body scoring your pregnant mothers once a week or once a fortnight during this crucial time period.

Body condition scoring is subjective at best so it should be done by the same person or set of people each time, if at all possible. If different people are body condition scoring, the extremes (too skinny or too fat) will be noticed, but subtle fluctuations between scores may be lost.

Luckily, those subtle fluctuations are not as important. Trends (up or down) and extreme body scores are actually the most important details to identify.

Body condition scoring is based on a various scales including: 1-10, 1-9 or 1-5, with the lower numbers indicating thin animals and higher numbers indicating fatter animals. The ideal body score in either a 10 point or 9 point scale is an approximate 5. Animals ranging from a 4-6 are acceptable but as an animal gets closer and closer to her last trimester her weight should hover around a 5-6. I prefer this because the up-coming demands of late-gestation pregnancy and early lactation will likely cause a dam to loose weight. I would like her to have an energy reserve to draw from. On the 5 point scale, 3 is considered ideal with 3.0-3.5 desired during late pregnancy. Obviously, specifying which scale is used is necessary to avoid confusion over the states of health of your animals.

Multiple sites can be used to body score an animal. Again, pick the sites that you like and are consistent. For a quick check I prefer the loin and ribs, as described by Jennifer Bowman in the September 2006 edition of *The Camelid Quarterly*.



A more detailed BCS assessment based on the 5-point scale can be found in Appendix A.

If problems with an animal's body condition are noted, measures should be taken as soon as possible to address the issue. Obesity is generally only caused by overfeeding. Although I do not advocate putting any pregnant female on a diet, further increases in calorie supplementation should be avoided. Low body scores are more varied in their causes. They can be physical in

origin (e.g. tooth issues, arthritis making grazing difficult), nutritional (poor quality hay or not being fed enough), or social (low-animal on the totem pole being pushed from the feed bunk). A veterinarian should be consulted when thin animals are found. At a minimum, a thorough physical exam is warranted on any skinny pregnant girl. Assessments of her nutrition and social environment should also be conducted.

Preparing The Dam: Feed her well and correctly

The last trimester of pregnancy and the first eight weeks of lactation are the most energy-demanding times in an alpaca's life. Lactating mothers need best-quality forages (Total Digestible Nutrition (TDN) 60%-70%, protein 12%-14%) with energy/protein supplements (up to 0.5% of body weight). Pregnant females in their 9-11 months of gestation need similarly high quality forage (TDN 55%-70%, protein 10%-12%) with additional mineral and vitamin supplements. Because of these nutritional demands, putting weight on a late gestation/early lactation female is nearly impossible, and any attempts to increase an animal's body condition score must be done while a female is open or during the first eight months of pregnancy.

But how do you get your dams at a good body condition score and maintain them there?

In my opinion, the basis of any management plan for alpacas MUST be good quality forage. Due to the idiosyncrasies of camelid metabolism (e.g. they are psuedoruminants that can't metabolize glucose well) no amount of concentrates will ever compensate for poor quality forage. Grains and pellets are supplements, not replacements. Knowing the quality of forage that you are feeding is often invaluable information when you are designing a feeding plan. However, remember that not all animals will respond to the same feed in the same way. No amount of time spent on a feeding plan will ever replace body condition scoring your animals to evaluate how each animal is utilizing the food they are being given.

Grains and pellets do have a place in the pregnant alpaca diet. Often in the last few weeks of gestation and the early weeks of lactation, concentrates are required in order to provide the energy needed by the dam to raise her cria. Concentrates should always be fed in addition to good quality forage, never in place of good quality forage.

Mineral supplements, offered as trace mineral mixes, should be part of your animals' diet. I prefer top-dressing mineral supplements rather than free-feeding them, but either can be done.

Ideally, the minerals should complement the excesses and deficits of minerals in the forage, but that is not always possible when hay sources change frequently.

Vitamins are also important in the pregnant animals diet. Vitamin D plays a role in bone development and may be needed to encourage straight legs in crias and to ward off rickets. Vitamin D should be supplemented in all growing and pregnant alpacas during the Fall and Winter months (in Colorado during the months of October-March). Vitamin D does not cross the placenta and is secreted in the colostrum but not the milk of the dam. Crias are therefore born with low levels of Vitamin D and supplementing the mother in the last 7 weeks of gestation is a good way of insuring that the neonate gets a good dose of Vitamin D during the first days of life outside the womb. The dose of Vitamin D for an alpaca is 1000-2000 IU/kg, but the frequency and amount will vary by the product used. Both injectable and oral formulations can be used, but consult with your veterinarian to insure that the proper amount of Vitamin D is given at the proper time intervals.

Vitamin E plays a role in maintaining muscle integrity, including cardiac muscle. Like Vitamin D, Vitamin E does not cross the placenta and is only secreted in colostrum, not milk. Crias therefore can be very deficient in this vitamin when they are born. Deficiencies in Vitamin E can lead to sudden death or weak crias. It can also indirectly lead to weight-loss and wasting in crias and difficulty breathing in adults. Supplementation of Vitamin E should be considered during periods of drought or when extensive dry-lotting is used since fresh green vegetation is the natural source of Vitamin E for alpaca.

The benefit of good nutrition throughout a pregnancy cannot be overstated. As more and more is learned about epigenetics (the study of how the environment changes the way genes work), the more we learn about the influence of the uterine environment on the lifelong health of the cria. Nutritional studies in other ruminant species such as sheep have shown that poor maternal nutrition during pregnancy can influence placental development which indirectly influences fetal development and health. Poor maternal nutrition can also determine fleece characteristics of the cria. For example, the number of secondary follicles that develop in fetus during the second trimester is influenced by maternal nutrition. Poor nutrition lowers the number of follicles that develop thereby decreasing the quality of the fleece of that cria. Changes such as these are permanent and cannot be changed by better feeding of the cria once it is born.

Preparing The Dam: Vaccines and anthelmintics

All neonates are born with a naive immune system. They do not, in general, have any circulating antibodies to help ward off disease. Newborn crias usually get their first protective antibodies from their mother's colostrum (maternal antibodies). For this reason it is important that any cria be encouraged to nurse colostrum during its first 12-36 hours of life and that the colostrum be loaded full of antibodies. The best way to get a large number of antibodies into the dam's colostrum is to vaccinate her 30-60 days prior to her due date. Although vaccines carry a small risk of reaction, this risk, in my opinion, is minimal when compared to the benefits to the cria of receiving a significant concentration of antibodies from the colostrum. In order to minimize vaccine complications, I advocate vaccinating pregnant dams using only killed vaccines, not modified live vaccines.

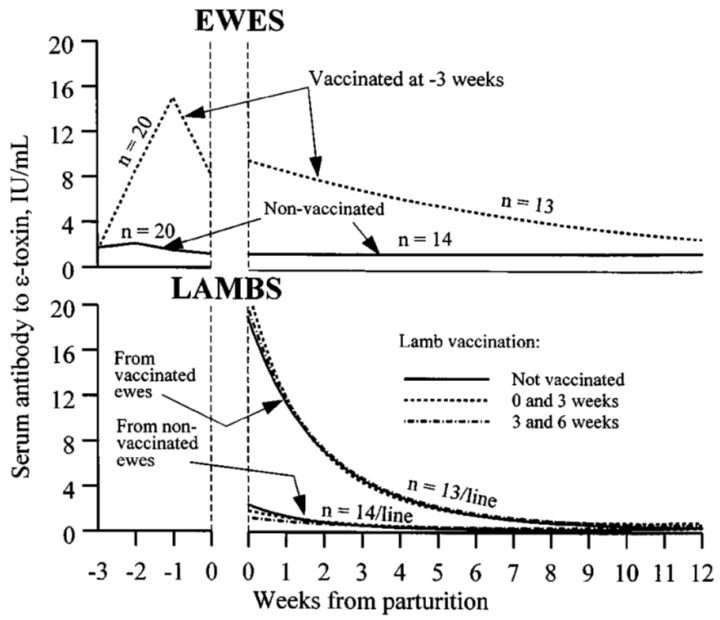


Figure 1. Effect of vaccination schedule of ewes and their triplet lambs on serum antibodies to ϵ-toxin of *Clostridium perfringens* type D.

Cristina de la Rosa, Douglas E. Hogue, Michael L. Thonney, Vaccination schedules to raise antibody concentrations against ϵ-toxin of *Clostridium perfringens* in ewes and their triplet lambs, *Journal of Animal Science*, Volume 75, Issue 9, September 1997, Pages 2328–2334.

In addition to diseases, crias are also very susceptible to internal parasites. However, given the growing amount of resistance to all classes of anthelmintics (dewormers) now being seen world-wide, use of these medications can no longer be indiscriminate. Anthelmintics have a time and place for their use and their use can be life-saving when given appropriately. Anthelmintics should not be used to overcome poor environmental conditions or poor nutrition. Fecal evaluations to assess worm burdens should be done before any anthelmintics is given. Fortunately, dry climates such as in Colorado, have a relatively low number of worms in the environment as compared to other states (no rain, no grass, no worms), but that can be taken as even more reason to be careful not to overuse anthelmintics. Before administering any medication please check to make sure that it is safe for pregnant females and consult with your veterinarian if you have any concerns.

Preparing The Dam: Managing the dam's stress

Stress in a pregnant animal is rarely a good thing. In pregnant alpacas it can be particularly detrimental. Alpacas are dependent on a body of tissue called the Corpus Luteum (CL) to produce progesterone, which is the hormone that maintains a pregnancy: no progesterone, no pregnancy. Prostaglandins destroy CL tissue. Prostaglandins are also produced during times of stress. For that reason, I recommend that any elective procedure (tooth trims, toe nail trims, trips in the trailer to visit school children) be done only after the cria is born. The exception to that advice is shearing. Heat stress is just that-stress. To avoid it, and to keep fiber from interfering with delivery and nursing, I recommend that pregnant girls be shorn in the summer.

Remember as well that alpacas are very herd-oriented animals. Pregnant females are often more calm when they have other female alpacas around them. I have yet to hear of a newborn cria ever being hurt by an "aunt". Isolating a pregnant girl may not be doing her any favors so don't feel that you have to do it. In fact, the anxiety caused by being isolated may make a new mother neglect her cria and be quite detrimental to the newborn. However, as much as alpacas like the company of their own kind, they may get nervous if too many humans hover around them. If your presence seems to be causing your soon-to-be mom too much stress, be willing to back away and leave her alone (a baby monitor/webcam comes in handy for these times).

One type of separation that might occasionally be necessary is to keep late gestation females away from other nursing crias. Occasionally a dam's colostrum will come in before she gives birth. If another cria nurses her at this time, that cria will drink all the colostrum and leave none for the

dam's own unborn cria, setting it up for failure of passive transfer. If you notice your pregnant dams being nursed by other crias separate them from the offending crias as soon as possible and make sure the newborn cria does not suffer from failure of passive transfer.

When a stressful procedure must be preformed or when bad luck causes a stressful situation, (e.g. the neighbor's dog gets into the pen), please consult with your veterinarian. There are prescription medications that can be given to both sedate animals to calm them or to chemically protect the CL from prostaglandins and thereby protect the pregnancy.

Preparing The Environment: The 4 W's

If I had my druthers, all cria would be born in a green, clean paddock on a warm spring day. Unfortunately, that isn't often what happens. While the settings that cria are born into may vary considerably, there are four important environmental elements that should be considered prior to any birth. These can be summed up as the 4 W's: washing, warmth, wind and wet. Addressing those four items will help insure that your crias' births are as easy and free of complications as possible, be they born in a barn, a paddock or the back of a trailer.

Washing (cleanliness) is of utmost importance. An immuno-naive cria born into a mud pit has an uphill battle ahead of it from the moment it emerges from its mother. The birthing area does not have to be sterile or even dirt-free, but it should have clean bedding (straw or hay are better than shavings or wood pellets). It should also have little to no manure in it and minimal exposure to any contagious elements. Giving birth in a pen also used for quarantine is not ideal. In a similar vein, a sun-baked dirt pen (the sun kills off many germs and contaminants) is often preferable to a rubber-matted stall with a large poop-pile in it.

Warmth is critical to a cria's survival as well. Nothing kills a cria faster than cold, so keeping a neonate warm is very important. Babies born during cold weather require heat lamps or a heated barn as well as a cria coat. (If the weather is cool enough for you to wear a jacket, plan on coating a cria until it is 2-3 months of age). Straw or hay should be used to bed stalls to help insulate crias from the ground or cold barn floor. Crias should have a rectal temperature of at least 98°F shortly after birth and before nursing. Never underestimate the good you can do by warming up a newborn cria. Also understand that on hot summer days, warmth can be detrimental. Neonates do not thermoregulate well and if left out in strong hot sun too long they can overheat. Any time

the weather is such that too little or too much warmth is possible, a newly born cria should be closely monitored for extremes in body temperature.

Wind is an important environmental element because it can cause hypothermia quickly. Any birthing area should be as draft-free a space as possible, especially during periods of cold weather. A variety of items (hay bales, tarps etc) can and should be used to create windbreaks if needed.

Wet is the last but not least of the important environmental factors. Wet crias are cold crias and cold crias have difficulty surviving. Babies born during rain, sleet or snow storms should be moved under shelter as soon as possible. Crias should be dried as soon as possible after birth by mechanical means (towels, hair dryers etc) if necessary, especially during cold weather.

Preparing Yourself: What you need to have on hand

Creating a cria kit can sometimes be as stressful as creating a cria. There is no perfect list. There is simply the list that works best for you. The following is a basic list of items that I would recommend but it should not be thought of as complete. Rather, you should feel free to use it as a start and then modify it to fit your specific needs and desires.

Medications can be part of your kit. However, since most of these are prescription drugs you should always consult with your veterinarian before purchasing or administering them. Examples of drugs that might be kept, but are by no means required, include: Vitamin A&D, Flunixin Meglumine, and antibiotics.

Suggestions for a Basic Cria Kit

Birth	After Care	Feeding
Watch	Betadine Solution	Feeding tube
OB Lube	Heat source: *lamp, pad, electric blanket, hot water bottles*	Feeding syringe
Soap/Scrub		Bottle and nipples
Paper Towels		Colostrum or colostrum replacer
Tail Wrap	Cria coat	
Infant suction bulb	Fleet enema (*applicator*)	Goat Milk
Old Towels	Thermometer	Glucometer
Blow Dryer		
Plastic bags *(for placenta, trash prolapsed uterus, etc.)*		
Vet's Phone Number		

Stepping Back.....

Normal Births: Knowing when you are not needed

Normal Pregnancy 'Facts':

- Lasts on **average** 335 days +/- 30 days
  - This large variability makes inducing a dam nearly impossible.
  - Calculated due dates, even with hand breedings, become guidelines not absolutes.
  - Be willing to be on "cria watch" 2 weeks before and after a calculated due date.
- Many females give absolutely no warning that they are going into labor.
- Udder development is not a good indicator of immediate birth.
- Sacrotuberous ligament relaxation and vulvar lengthening can be signs of immediate birth.
- **Most**, not all, births occur during the day around noon.
- **Most**, not all, births require no assistance.
- The fetus generally can be seen to move during the last 2 months of pregnancy.
  - Watch the right flank. Movement in the left flank may be rumen.
  - The fetus can often be felt kicking during this time as well.
  - The fetus generally can be "bounced" during the final month of pregnancy

The vast majority of all alpaca births require no assistance from the owner. During these births you are at most a passive observer and sometime you aren't even around. Unassisted births are what we all hope for but rarely believe we will have. Given the likelihood that the birth of your cria will be normal, however, sometimes it is good to step back and realize when you aren't needed. Not only does understanding what is normal help keep you from interfering when you shouldn't, understanding what is normal also makes identifying 'abnormal' easier.

What is a normal pregnancy and delivery?

The word 'normal' when applied to an alpaca delivery can have a broad definition. In general, as in other species, an alpaca labor can be divided into three distinct phases: 1, 2, and 3. With alpacas, knowing when those phases will begin is one of the most difficult aspects of the entire birthing process. The normal variation in the length of gestation means that the most valuable role you will often perform is that of an astute observer.

Phase 1

Phase 1 is early labor. It can last from 1-6 hours (in maidens it can last 24 hours) and has no signs specific to it. Animals generally become restless but not always. Some go off food and isolate themselves or act depressed. Phase 1 labor is the most difficult phase of labor to recognize since the changes in an animal's behavior can be subtle. It is your responsibility as an owner to observe and know your animals so that you can tell when your pregnant girls enter this stage of labor.

This stage typically starts early in the morning. You may see an animal straining at the poop pile, lying down more frequently, eating less and chewing her cud less. You may also notice some mild contractions and bulging of the area under the tail. The vulva slit should be beginning to elongate and relax. Vaginal palpation will reveal a soft, partially dilated cervix. This phase ends when the cervix fully dilates and the fetus, or at least the fetal membranes, begin to move into the birth canal.

Phase 2

Unlike Phase 1, Phase 2 has very clear signs. This is active labor, the stage during which the cria is born. Phase two begins when strong uterine contractions are seen and when evidence of the cria begins to emerge from the vaginal opening. This evidence can be anything from fluid to a sac bulge or visible cria 'parts'. Alpaca typically do not have a large 'water break'. Often the amount of fluid resembles a small urine stream. Again, signs can be subtle.

Once the cria begins to emerge, progression of the delivery should be seen at least every 10-15 minutes. The cria normally presents anterior (head first) dorsosacral (its spine agains the dam's spine). The head and front feet appear together. The head lies between or above the front feet, and the nose is about level with the fetlocks or knees of the cria. The cria may present at a 45 degree angle in order to squeeze through the widest part of the pelvic opening.

Once the head and feet emerge the dam may 'rest' and allow the cria to hang for 10-20 minutes. As long as the dam is not distressed (she may walk around and eat), then allow this time to pass without assisting. If the dam will allow you to approach, you can remove the sac from the cria's nose as it will often be looking around and trying to breath through its nose by this time. The dam will eventually resume contractions and expel the cria entirely.

Phase 2 should typically last approximately 20-30 minutes. It can last up to 60 minutes, but not typically. It ends with the full delivery of the cria. Bleeding should be minimal, although in maidens you can see some blood dripping from superficial vulvar tears.

Phase 3

Phase 3 of labor is rather anticlimactic. It is the phase during which the placenta is delivered and it often occurs unnoticed by observers who now have a new cria to distract them. This phase may take 4-6 hours. Once the placenta is delivered (it should **NEVER** be pulled), it should be examined to see if it is complete and then disposed of or frozen. I encourage owners to keep placenta if they can in case tissue from the pregnancy is needed later in the birthing season for disease analysis.

After Delivery

After the delivery the perineal region of the dam quickly returns to normal size, usually within 24 hours. A light red to brown discharge might be noted for 3-4 days post delivery and a mucoid 'glob of goop' can be found in the poop pile 10-14 days after delivery as well. These findings are all normal, especially if the dam is active, eating and producing milk. None of these discharges should have a malodorous smell.

Even the best dams will not lick their cria dry. The membrane covering the cria typically dries and flakes off if it is not removed by vigorously applied towels. Cria must breathe through their noses and occasionally the membrane can be too thick for a weak cria to break. As owners you are allowed to remove the membrane from the cria's nose as soon as you wish. Cria have been suffocated by this membrane when it fails to break.

Cria should have a rectal temperature of 98°-100°F, stand in 1-2 hours and should nurse within 2 hours. If they don't they risk not getting enough maternal antibodies to provide immune protection. Remember, crias are not born with an active immune system, so they need to absorb

all the antibodies they can from their mother's colostrum. This absorption only takes place during the first 24 hours of a cria's life. Crias should consume 5% of their body weight in colostrum in the first 6 hours of life and 10% of their body weight within the first 12 hours. Always check the dam to make sure that she has milk in her udder. Even the most vigorous cria will decline rapidly if it has nothing to eat.

A cria is normally born with toe caps that may fall off soon after birth and standing. This is normal. It did not just lose its toe nails, it may also have very visible hairless areas on their legs. These are the metatarsal glands and they are also normal. The cria should pass meconium within 1-2 hours of nursing. Enemas are not needed right after birth. Give the colostrum time to do its multitude of jobs.

Rules of Thumb

A normal delivery can be a very exciting and joyful thing to watch. It is relatively quick once Phase 2 has begun and ends with a healthy, active cria standing on legs that look comically too long and thin. As a summary, Dr. Kim Gardner-Graff, observer and participant to a multitude of alpaca births, has come up with the following rules of thumb:

Dr. Kim's Rules of Thumb for Normal Deliveries

1.Resist the urge to help. Too much activity can slow down labor. 95% of births will be normal.
2. Most females in Phase 1 labor in the morning will be in Phase 2 by noon.
3. In Phase 2 progress should be seen every 10-15 minutes.
4. Phase 2 usually lasts no more than 45 minutes.
5. Don't pull on the placenta.
6. Dams must have milk and crias must get the first milk.

Jumping in....

Dystocias: What to do when things go wrong.

Although most all alpaca births are normal, the small percentage that go wrong can do so dramatically. Most owners worry about whether they will be able to manipulate a fetus in order to help extract it. Surprisingly, that skill is really not the most important one to learn. The best skills an owner can bring to a dystocia are those of observation and understanding. Early recognition of (knowing when something is wrong and knowing it quickly) and early intervention in (correcting the problem quickly) a dystocia are often the best tools an owner can use to give both the dam and the cria the best chance to make it through the birth alive.

Dystocia: Worry about everyone but worry most about these girls

Any pregnant female can have a dystocia. However some girls are in a higher risk category and should be watched closely. These include: maidens, females with a history of previous dystocias or torsions, overdue females, females with a history of a c-section, vaginal disease or retained placenta.

Dystocia: Pre-labor

Pre-labor "dystocias" fall into three main categories: overdue females, early labor and uterine torsions. Overdue females are the simplest. They are either not pregnant or they are going to give birth on a day that you aren't expecting. Ultrasounds are the best method for assessing pregnancy status in late term girls since progesterone levels can vary significantly. If she is pregnant (positive ultrasound, fetal movement noted, spitting at males etc.) and the female is acting normally then you should just let her be. She will deliver when she delivers. (Dr. Kim has had an alpaca go 444 days). The significant variability in the normal gestation period of alpacas makes induction too risky to recommend. Induction can very easily cause a premature cria to be born. Females that are overdue should be watched closely but left in peace.

Stress can induce an early labor and therefore should be minimized. Pick your poison between heat stress or shearing stress but I typically recommend shearing the pregnant girls. At least we

can control that stress we and we can pretreat with medications to reduce the risk of premature labor.

Uterine torsions are true emergencies. They occur when the uterus flips over itself causing a twist in and occlusion of the blood flow in the uterine tissue. If not corrected, they can be fatal to both mother and cria. Torsions are most common in the last trimester of pregnancy. No one knows what causes them or how to prevent them.

Unfortunately, the signs of a uterine torsion look very similar to Phase 1 labor: not eating, getting up and down frequently, straining at the poop pile, isolating behavior, laying sternal with hind legs out. Rarely do I see the violent tossing and rolling that many sources describe.

Diagnosis of a torsion is done by rectal and vaginal palpation. Torsions are corrected in the field by rolling the female while stabilizing the uterus, in effect causing the alpaca to roll around the uterus and untwist it. Field correction is not always possible. If it is not, surgery is the only alternative. Early detection and treatment of a torsion often results in a successful outcome. For that reason, any girl that is in late pregnancy and seems "off" or stuck in Phase 1 labor too long should be examined that same day.

Dystocia: Phase 1

Phase 1 dystocias are the hardest to recognize because Phase 1 labor can be so nebulous. You should worry if Phase 1 does not progress to Phase 2 in 6 hours or before 6 pm. If a female spends more than an hour actively straining over the poop pile without any signs of progression a veterinarian should be consulted. Likewise if a female spends a lot of time rolling or on her side she should be examined.

Dystocia: Phase 2

Just as Phase 2 labor is much more clear cut than Phase 1 labor, Phase 2 dystocias are usually very obvious. Signs of such a dystocia include blood or bloody fluid coming from the vulva, an amniotic sac appearing or bursting with no cria following in 15-20 minutes; no change in a visible cria's position if a dam has been pushing for 10-15 minutes; a female spending a lot of time down on her side or rolling; a female vocalizing loudly during contractions, a placenta coming with (or before) a cria. Seeing cria parts other than a head and two front feet will also indicate a dystocia.

Likewise, a head and two front feet presenting but with the head extending past the feet often indicates a mild 'shoulder lock' dystocia, but a dystocia nonetheless.

Dystocia: Phase 3

Alpacas rarely retain their placentas, but they can. I like to give females at least 4 hours before administering oxytocin. Most 'retained' placentas that I have been called about have usually delivered prior to the 4 hour mark. At the time of that injection I recommend tying a water-filled rubber glove to any placenta tissue that is hanging. This provides gentle traction on the placenta and helps it to be delivered. Remember: NEVER pull on a placenta. The oxytocin can be repeated at hour 6 postpartum. Contact your veterinarian if a placenta is retained longer than 6 hours. Females with retained placentas or suspected of having parts of the placenta left in the uterus should be started on antibiotics within 24 hours.

An alpaca can prolapse their uterus during Phase 3 labor. If this occurs owners should attempt to keep the uterus as clean and hydrated as possible. Wrapping it in a plastic bag or cling wrap is a good, simple means of doing this. The female should be kept as quiet as possible. Treatment is to clean and replace the uterus (making sure that the uterus is completely unfurled once replaced) and start the alpaca on antibiotics. Uterine flushes can also be started at this time. The prognosis for rebreeding can be quite good if this condition is managed early.

Dystocia: Diagnosing and fixing the problem

Once you suspect that you have a dystocia, act on it. Trust your instincts. If you think something is wrong, have it checked out. Some owners prefer a veterinarian to do the diagnosing, some owners don't have a choice and must do it themselves. Regardless of the situation, your first step should be to CALL YOUR VETERINARIAN. Trust me, we appreciate being kept in the loop (and we can even help sometimes). If your veterinarian cannot make it to you, you may have to make the diagnosis. In order to do so, the following procedure is suggested:

DYSTOCIA DIAGNOSIS: Getting Ready

1. Find the most competent person with the smallest hands (no larger than size 8).
2. Restrain the female.
3. Be clean
    1. move the female to the cleanest area possible
    2. wrap the tail or have some one hold it out of the way
    3. clean the perineal area with soap and water
        1. warm water is best, but not required
        2. wash at least three times
    4. use gloves
    5. keep your nails short and clean
    6. remove jewelry
4. Use lube liberally
    1. there is never too much lube
    2. a red rubber tube can be handy for injecting lube into the uterus

Once you have the perineum clean and your gloves on coat your gloved hand with lube and gently ease it into the vulva. If you cannot get your hand comfortably into the vulva, then the alpaca may not be dilated and you may be dealing with a torsion. You may encounter the hymen in maidens about 2 inches in past the vulva. You should be able to place one finger into the opening of the hymen that the male made when he bred her and gently stretch the opening larger until you can get your entire hand into the vaginal vault. The stretching of the hymen will not be comfortable to the female and she may react to you doing it.

As you place your hand into the vaginal vault the thought going through your head should not be "how am I going to get this cria out" but rather "what part of the cria will I find first"? Identifying what part of the cria you are feeling is of utmost importance. You cannot correct a dystocia if you do not know what you are correcting. Significant damage can be done to both the dam and the cria if you don't take the time to correctly identify the problem. Imagine if you will

what harm could be done if you attempted to deliver a cria by pulling a front leg and hind leg through the cervix simultaneously.

If you feel a leg, flex the first two joints of the leg. If they bend in the same direction it is a front leg. If they bend in two different directions they are a hind leg. Follow the leg to the body and attempt to identify a head or buttock and the attachment of the other leg. Before attempting to manipulate the cria always make sure both legs belong to the same body. Twins are rare but they do occur.

Once you have identified what part of the cria you have and that all the parts belong to one cria you should attempt to get it into one of two positions: anterior dorsosacral (flying Superman) or posterior dorsosacral (hind legs out first). Crias can be delivered with relative ease in either of those orientations.

The number of improper positions that a cria can assume can seem staggering. Appendix B is a chart that shows some of the most common abnormal findings and recommendations on how to correct them. If at any time you do not feel comfortable identifying how the cria is positioned or how to correct the positioning then stop. Force and frustration are a deadly combination when dealing with a dystocia. Slow and gentle should be your mantra.

Dystocia: c-section

Most dystocias in alpacas are caused by a malpositioned fetus. With early intervention these can often be corrected without a c-section. However, sometimes, if the dystocia has been ongoing for a long time and/or the cria is dead or deformed or if the cria is simply too big to fit through the pelvic opening (rare but it does happen), then a C-section may be the only means of saving the dam.

I believe that if a c-section is an option it should be done sooner rather than later. Both the dam and the cria stand a better chance of surviving if a c-section is not performed after every other option is exhausted. I recommend that owners consider which animals they would be willing to have a c-section performed on and which they would not prior to the beginning of the birthing season. Trying to make such a decision in the middle of a dystocia is never ideal.

Now the work really begins....

Life with a neonate

Once the cria is delivered, assisted or unassisted, steps need to be taken to make sure it has the best possible start to life. Amid the joy of welcoming a new life to the farm, assessing the maturity of the cria, its health and the health of the dam should be done. In the days following the birth, close attention must be paid to the cria to make sure it continues to grow and thrive in its new environment.

Cria: First look to first steps

Once born a cria should be stripped of its epidermal membranes and dried with towels or a hair dryer. The umbilicus should be dipped or sprayed with 3%-7% iodine to minimize infection. The cria will likely have a fast respiratory rate (30 bpm) and may have flaring nostrils. Flaring nostrils this early after birth does not always indicate choanal atresia. Give the cria a chance to calm down before assessing its ability to breath.

Once the cria is dry and free of membrane, you should step back and let mom and baby bond. Watching is all that should be needed for the next few hours. Healthy cria should attempt to stand within 15 minutes and should be able to stand within 2 hours. They should have a strong suckle and be nursing within 2 hours of birth. Once the cria is up and nursing a quick exam should be done to asses its overall health: it should be weighed; it should be checked for a complete palate and eruption of teeth; its temperature should be taken; its umbilicus should be palpated for a hernia; and its heart should be auscultated.

Nursing is the most important thing that a cria can do in the first few hours of its life. Cria normally nurse for 1-5 minutes at a time. If a cria seems to be nursing more frequently you should make sure that the dam has milk and that her udder is not engorged or edematous making it difficult for the cria to latch on. If a cria does not nurse within 4 hours of being born you should supplement it with colostrum of some sort. Ideally you should milk the dam and feed her colostrum to the cria. However, goat, cow or sheep colostrum can be used (ideally make sure it comes from disease-free animals). Colostrum replacers can also be used in an emergency.

Tubing a cria should not be done more than twice or inflammation of the esophagus may result. Never tube more than 3-4 oz of fluid to a newborn in one feeding.

If a cria needs to be bottle fed, you should aim to give it 10%-15% of its body weight in milk a day. Goat milk is a good choice for alpaca crias, but cow and sheep milk can be used. If canned goat's milk is used it should be diluted 50:50 with water. Feedings should be done every 2-4 hours initially. Healthy bottle-fed cria should be allowed to sleep through the night.

Cria: What could be wrong

If a cria has floppy ears, weak joints and no erupted incisors it is premature. Cria born earlier than 320 days of gestation often have underdeveloped lungs and rarely survive. Premature crias will need extra care. Getting them to thrive can be difficult and time consuming but it can be done if they are not extremely premature.

If a cria is unable or reluctant to raise its head soon after birth and/or it has trouble standing, then it is considered a weak cria. It should be checked for hypothermia and hypo/ hyperglycemia. Cold crias should be warmed with heating pads, heating lamps or warm water bottles or baths. Hypoglycemia should be treated with dextrose or syrup initially but may require IV fluids and dextrose.

Crias that stand and attempt to nurse but can quite seem to figure it out may be 'dummy cria'. They have suffered cerebral hypoxia during the birth and now how cerebral edema. They will be unable to nurse for themselves initially but if you can help them to get nourishment for the first 24-48 hours of their lives they usually begin eating on their own and do well.

Depressed, weak crias that lose weight or fail to thrive may be suffering from septicemia. These cria need to be aggressively treated and often need hospitalization.

Crias that do not or cannot nurse well early on are at risk for failure of passive transfer. Failure of passive transfer (FTP) leaves a cria with little active immunity early in its life. In a clean environment with minimal disease challenges, these cria may be just fine and survive well. (Cria rely on maternal antibodies for the first few months of life only. After that their own immune system will take over). However, often FTP leaves them very vulnerable to infections. Any cria suspected of having FTP should be monitored closely. Plasma transfusions can be administered to try and correct this condition.

If a cria is struggling to breathe or open mouth breathing it may be suffering from choanal atresia. Alpacas are known to have a large number of congenital defects and every cria should be closely examined during the first few days of life for any such defects. Lethargic crias may have heart defects. Thin crias may have a cleft palate. Cria that don't defecate may suffer from anal aplasia or colon aplasia.

Crias examined shortly after birth may appear to have angular leg deformities. However, no judgement should be passed until the cria is at least 24 hours old. If angular deformities are found to exist, any desired non-surgical treatment should be initiated within the first 2-3 days after birth.

Cria: The first few days of life

Once the cria is nursing well, there is little that you need to do. Just stand back and be amazed. You should weigh the cria daily for 7 days, then weekly for 4 weeks. Cria can gain up to a pound a day but the trend is often more important than the actual number. Crias should trend up in weight, not down.

Crias should pass their meconium in 12 hours. If they don't you can try administering a small warm-water enema. However, don't assume that all crias need enemas. They don't.

Vaccinations and other treatments should be discussed with your veterinarian. They will vary farm to farm and animal to animal. Clostridium CD&T can be given as early as 2 days postpartum but may not be needed until 30 days.

In conclusion

This booklet gives only the briefest of overviews to neonatal health in alpacas. While it may provide a quick introduction to the topic, I encourage you to consult with your veterinarian about any questions it raises. There is no blanket approach that works for every farm and every animal. However, with your insights and your veterinarian's medical knowledge I am convinced that your farm can develop a plan that keeps the birthing season as joyful as it was always meant to be.

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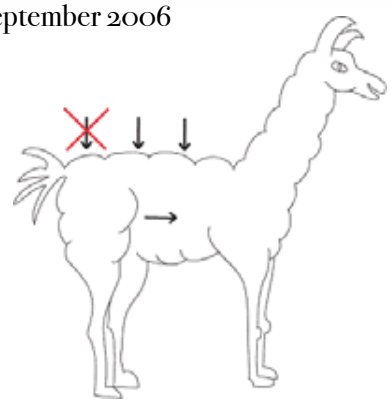
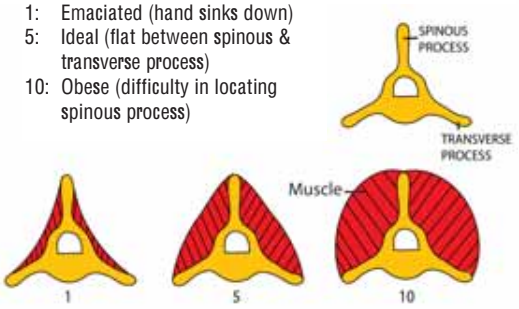
Body Scoring Llamas and Alpacas

By Jennifer Bowman, MS



SCORE CHART 1 – 10

1: Emaciated (hand sinks down)
5: Ideal (flat between spinous & transverse process)
10: Obese (difficulty in locating spinous process)



What is the body condition of your lamoids? Can you tell just by looking at your animal? What does body weight really tell you about your animals' nutritional status? Both the alpaca (1A, 1B) and the llama (2A, 2B) were reported as being in good condition based on visual inspection while still in full fleece.

After shearing, it is more evident that these animals represent the extremes of body condition scores.

Body scoring is a palpating skill that will allow you to evaluate the fat and muscle mass condition of an animal and assign it a value. This is a useful tool that helps you determine what dietary adjustments should be made to your feeding program. Camelid nutritional requirements vary based on development, work load, physiologic and environmental conditions. Regular body scoring of animals can be done quickly at the same time as other maintenance procedures, like vaccinations or toe nail trimming. Once proficient with this hands-on technique, you will find yourself body scoring animals as you walk past them.

Body scoring evaluates three locations: two along the back (withers/thoracic vertebrae and lumbar vertebrae) and one on the rib section behind the elbow. Do not evaluate directly over the pelvic area.

Locate the spinal vertebrae. The spinous process is the vertical structure on the center of the vertebral body and is the site of spinal muscle attachments. A line of connecting spinous processes feels like a ridge down the topline of the animal. The transverse process is the horizontal structure extending from each side of the vertebral column and is the site of spinal muscle attachments.

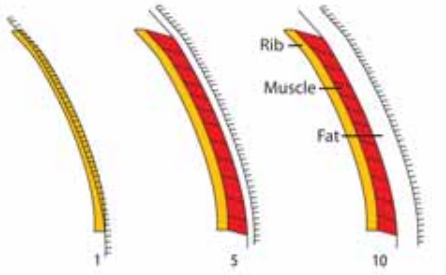
The first site for palpation is the region of the lumbar vertebrae, just in front of the stifle on the rear leg. Stand on the side of the camelid, place the tip of your middle finger on the spinous process and the heel of your hand on the transverse process. Nestle your hand flat against the skin allowing your hand to follow the contour of the underlying muscle mass. Ignore any amount of wool on the animal. A lamoid can be properly body scored despite the presence of an abundance of fiber. Score the animal from 1-10.

Repeat at the second site of palpation; the thoracic vertebrae.

Examine the muscle and fat overlying the ribs, behind the elbow.

Score 1 – 10

1: Emaciated – ribs protrude significantly
5: Ideal – feel ribs easily, without protrusion
10: Obese – can not find the ribs due to excess fat



What body condition are your lamoids in? Can you tell by just looking at your animal? What does body weight really tell you about your animals, nutritional status? Both the alpaca (1A, 1B) and the llama (2A, 2B) were reported as good condition based on visual inspection while still in full fleece.

TAKE HOME MESSAGE:
You must palpate your animals to understand their body condition.

CQ

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Appendix B: adapted from Anderson, David. "Neonatal Care For Camelids: Breeding to Birthing To Weaning." Manhattan (KS): KSU Veterinary Medical Continuing Education, 2008.

Situation	Findings	Posture	Solution
Normal	Head and feet present at the vulva at the same time. The head is on top of the legs and coming together at a regular pace.	Head forward, cria's spine in line with dam's spine	Do nothing
Abnormal	Head only	Head and neck are presented but front legs are flexed back along the cria's body or folded at the pelvic canal.	Push head and neck back gently while grabbing each front foot and maneuvering them into the pelvic canal. The head is extended and the front legs and head are gently pulled.
	Head and one foot	The head and one foot are presented normally but one limb is flexed back.	Repeat as above manipulating only one leg.
	Front legs but no head	Front legs are presented normally but the head is flexed back along the cria's body.	The front legs are pushed back and the head is grasped and maneuvered into the pelvic canal. The head and front legs are extended and pulled out.
	Rear legs	Both rear legs are presented.	Pull gently on both legs and deliver the cria.

Appendix B: adapted from Anderson, David. "Neonatal Care For Camelids: Breeding to Birthing To Weaning." Manhattan (KS): KSU Veterinary Medical Continuing Education, 2008.

Situation	Findings	Posture	Solution
Abnormal	One rear leg	One rear leg is extended, one is flexed against the cria's body.	Push the rear limb back in, grasp the other rear leg and maneuver it into the pelvic canal. Extend both rear legs and deliver the cria.
	No head or legs	1) not pregnant 2) already gave birth 3) cria is presented without head or limbs in the pelvic canal	1) wait for a veterinarian 2) try to gently maneuver the cria into a position that you can deliver
	One front leg and one rear leg	1) twins 2) cria is presented sideways	Push the legs back in. Determine if there is one cria or two. Grasp one leg and try to bring the cria up into the pelvis. Find matching legs and try to maneuver them into the pelvis.
	Tail	Cria is presented backwards with both rear legs flexed up against the cria's body	Push the buttocks back in and grasp one rear leg. Maneuver it up and into the pelvic canal. Repeat with the other leg and deliver the cria backwards.
	Head is presented in front of the front feet	Cria is 'shoulder locked'. Both elbows are flexed along side the cria's body	Grab both front legs and gently pull one after the other to extend the elbows.

Appendix C: Adapted from Anderson, David. "Neonatal Care For Camelids: Breeding to Birthing To Weaning." Manhattan (KS): KSU Veterinary Medical Continuing Education, 2008.

Feeding Guide for Crias				
Weight (lb)	**Weight (kg)**	**Min Volume (ml/oz)**	**Max Volume (ml/oz)**	**Suggested Feeding Volume (oz)**
15	7	700/23	1000/33	2-4 every 2-4 hrs
20	9	900/30	1350/45	3-4
25	11	1100/37	1700/56	3-5
30	14	1400/46	2000/66	5-7
35	16	1600/53	2400/80	8-13 every 4 hrs
40	18	1800/60	2700/90	10-15 every 4 hrs