The general practitioner should be familiar with normal cria behavior and parameters so that high risk animals can be targeted early on and supported as needed to improve the chances of a favorable outcome. Crias are sometimes affected by conditions that are also common in neonates of other species. However, there are some medical problems that are more frequently seen in newborn llamas and alpacas.

The gestation length averages 340 days but new world camelids (NWC) are believed to have the ability to slow the development of the fetus under unfavorable conditions which may be one of the reasons why the range for normal gestation is so broad (335 to 370 days). Having such a broad normal range can make it difficult to determine if a cria is premature, so the term dysmature is more appropriate in most instances. Crias are typically born during the day, most commonly in the afternoon. Crias that are born outside of the range of pregnancy mentioned above or born at night should be considered at a higher risk of having complications and monitored closely. Crias whose dams are primiparous, underweight, or had a difficult parturition should also be considered at risk.

**HIGH RISK CRIA**

- Born at night
- Born with extreme weather
- Primiparous/ underweight dam
- Dysmature/premature (>335 days)
- Born through C-section or dystocia

Crias are born covered by a thin transparent membrane, the epidermal membrane, that dissolves after birth. Unlike other domestic species, alpacas and llamas do not clean or lick the newborn. A normal cria typically will cuss 5 to 15 minutes after being born and it should be able to stand up and nurse within 2 to 4 hours. New born crias should be examined for signs of congenital defects and/or signs of dysmaturity as listed below:

**SIGNS OF DYSMATURITY**

- Silky hair coat
- Patent urachus
- Low birth weight
- Unerupted incisors
- Curvy or floppy ears
- Angular limb deformities
- Tendon laxity and limb abnormalities

**COMMON CONGENITAL DEFECTS**

- Wry face
- Atresia ani
- Cleft palate
- Choanal atresia
- Imperforated vulva
- Ventricular septal defect
- Angular limb deformities
Dysmature crias are at high risk of failure of passive transfer since they are more likely to be weak and have limb deformities that could hinder standing and nursing. They may also have difficulties regulating their body temperature so it is important to protect them from extreme temperatures and to keep them dry.

Congenital birth defects are seen more frequently in NWC than in most other domestic species. Early recognition is key to avoid unnecessary suffering and expenses associated with plasma transfusion or advance care in animals with irreparable defects. Even though not every congenital defect is hereditary, animals with congenital defects should not be bred since there is a potential to pass on the defect to the offsprings. Choanal atresia should be suspected in crias with open moth breathing. Affected crias typically struggle to nurse and will be at risk of aspiration pneumonia and hypoxia. Treatment may be attempted in crias with a unilateral defect but euthanasia is recommended for severely affected animals. Another defect that can be very difficult to repair is cleft palate, especially when both the soft and hard palate are involved. The defect may be missed early on but affected animals are likely to develop nasal discharge and aspiration pneumonia. Cardiac defects should be suspected in crias with murmurs of grade IV or louder, especially if murmurs persist after correction of systemic problems. Transient murmurs may be present in normal crias during the first few days of life but they disappear after closure of the foramen ovale or ductus arteriosus. Diastolic murmurs or murmurs auscultated on the right side are more likely to be significant. Most cardiac defects can be diagnosed by echocardiography. Crias with atresia ani and a rectovaginal fistula may not show clinical signs if they can defeate through the vulva so this defect can sometimes go undetected. Crias with a totally or partially (depending on the size of the opening) imperforated vulva will typically have stranguria. This defect is believed to be heritable since the defect was found in two full siblings[2] but it has a good prognosis after a rather simple surgical correction. Many angular limb deformities are mild and resolve during the first few days of life as long as the animal can walk and place the foot pad of the affected limb/s on the ground. If the deformity is severe and the cria is walking on the dorsal aspect of the fetlock, passive range of motion exercises can be attempted several times per day. Some affected animals may require splinting of the affected limb/s until the defect has improved. Referral may be recommended for crias that fail to respond to these treatment options so that other treatment modalities can be evaluated.

INITIAL CARE

The umbilicus can be a port of entry for bacteria so it should be dipped with a 0.5 % chlorhexidine solution or 2% to 3 % iodine tincture 2 to 3 times a day until it dries off. Shelter should be provided during inclement weather and a coat can be used if necessary. Crias suffering from hypothermia will often be depressed and unwilling to nurse increasing the risk for failure of passive transfer of immunity. Affected crias should be warmed by using external heat sources (heated towels and blankets, heat lamps, hot water bottles, etc.). Excessive heat should be avoided since it can cause cutaneous vasodilation and compromise of the cardiovascular status. IgG levels should be assessed at 24 to 36 hours of age.

PASSIVE IMMUNITY

The gold standard test to evaluate adequate passive transfer of immunity is radio-immunodiffusion (RID). This test is considered superior than others because it is quantitative so the laboratory will report an actual IgG concentration instead of a range. However, one
disadvantage is that results are typically not available until the following business day. Because of this, it is not uncommon to use other less specific tests (total solids, sodium sulfite, foal snap test, etc.) to rapidly determine if the animal is at risk for failure of passive transfer (FPT). In general, one can assume that there is FPT if IgG concentration is < 600 mg/dL or if total solids are < 5 g/dL.; and partial FPT if IgG is 600 to 800 mg/dL or if total solids are 5 to 5.5 g/dL. Most crias require 1 unit of plasma (about 300 ml) for treatment of partial FPT but larger crias with FPT may require 2 units of plasma in order to achieve acceptable IgG levels. Crias that are septic may have high IgG demands so their levels should always be assessed after plasma transfusion since some crias may need a total of 4 units before they reach acceptable IgG levels.

Plasma transfusions should ideally be done via the intravenous route. The intraperitoneal route is less time consuming but it may not be as effective and it can potentially cause abdominal discomfort and peritonitis. Commercial plasma is preferred when available but one can also bleed adult animals from the same farm if necessary and store plasma frozen for up to one year. The ideal donor would be an animal that has not been used for breeding such as a castrated male (to decrease chances of having had contact with other blood types), it should have a body condition score of 3/5 or higher and a FAMACHA score of 1 or 2, and it should have never tested positive for *Mycoplasma haemolamae*. If the cria appears healthy, a short term, 18 gauge 2 inch long, IV catheter can be used, but if one suspect that the cria will need further medical treatment, a long term catheter is preferred. The cria should be monitored closely during the transfusion to detect signs suggestive of a transfusion reaction (flaring of the nostrils, and elevation in rectal temperature, heart rate and/or respiratory rate).

**FEEDING THE NEONATAL CRIA**

If nutritional supplementation is needed, it is recommendable to use an alpaca milk replacer or goat’s milk. One can also attempt to milk the dam but this can be stressful to the animal and it is often unrewarding since it is hard to get more than 60 ml at a time. Nasogastric or orogastric intubation can be done once or twice but it is discouraged if needed to be done repeatedly since it can traumatize the esophagus. The goal is to feed about 15% of body weight but it is advisable to start at 8 to 10% of body weight to prevent gastrointestinal disturbances such as diarrhea or constipation when using milk replacer. A newborn cria has a very small gastric capacity (about 230 ml) so small meals must be offered every 2 to 3 hours. If the cria is bright one can attempt bottle feeding which requires a lot more patience than bottle feeding a calf. Animals that are hospitalized and unable to nurse or take the bottle can benefit from placement of a nasogastric feeding tube. Neonates should be weighted daily to assess their progress and to adjust their nutritional needs accordingly.

**SEPSIS**

Clinical signs of systemic inflammation should be taken very seriously since the medical status of affected animals can change quickly. Initial signs may include lethargy, failure to nurse and gain weight, hypothermia, tachycardia, tachypnea, and hyperemic mucous membranes. Blood work should be performed on any cria considered at risk of sepsis. CBC findings typically include elevated fibrinogen, toxic changes in neutrophils, leukocytosis, more commonly seen with gram positive infections, or leukopenia, more common with gram negative infections, with a left shift [3]. Other blood work abnormalities may include hypoproteinemia and
hypoglobulinemia, hypoglycemia or hyperglycemia, azotemia, and electrolyte abnormalities. Ideally, a sample for blood culture should be obtained before antimicrobial therapy is implemented. Gram positive [4] and gram negative [3] bacteria have been recognized as potential causes of sepsis in NWC so broad spectrum antibiotics are indicated for crias at risk. Flunixin meglumine (0.5 mg/Kg, IV, q 12 - 24 h) can be used as an anti-inflammatory. Fluid therapy should be implemented to provide cardiovascular support and reduce the risk of renal failure. Hypoglycemia should be addressed with 10% dextrose (3 to 5 mL/Kg over 5 to 10 minutes) preferably instead of giving a bolus of 50% dextrose since sick crias tend to develop hyperglycemia. High blood glucose concentrations can have a diuretic effect and cause dehydration and subsequent hypernatremia. These cases require intensive care since insulin is indicated to address hyperglycemia and hyponatremia (hyperosmolar syndrome).

VACCINATION

There are currently no vaccines in the United States that are label for camelids. However, off-label use of certain vaccines is often highly recommended. The vaccination schedule for crias will depend mostly on the prevalence of specific diseases seen in that geographical area, and on the vaccination schedule of the pregnant dams. The most commonly used vaccine in NWC is the vaccine against *Clostridium perfringens* types C and D and *C. tetani* (CDT). Crias can be vaccinated with this vaccine at 3 to 4 months of age if the prevalence of the disease is low in the area and if the pregnant dam was vaccinated during late pregnancy. However, some crias are vaccinated during the first week of life if the dams were not vaccinated during pregnancy and if the risk of disease is high. A booster is recommended 3 to 4 weeks after the initial vaccine and once a year after that. Other vaccines that are commonly used in NWC include 7 and 8 way clostridial vaccines (*C. septicum, C. sordelli, C. novy, C. chauvoei*, and *C. hemolyticum*) and rabies. Vaccination against rabies is recommended for animals with potential exposure to wild life and high contact with humans (petting zoo, show animals, etc.). It can be performed with a large animal killed vaccine at 3 to 4 months of age and then repeated annually.