

# CAMELID MEDICINE CABINET

Pamela G. Walker, DVM, MS, DACVIM-LA  
Camelid Care Veterinary Services

The camelid population is continuing to grow in the United States with an increasing need for scientific information about proper dosage for medications in camelids. There is ongoing research in many institutions to try to find answers for these questions. The lack of complete information represents a challenge for veterinarians and camelid owners when determining a course of treatment for their camelid patients. As camelid owners it is important to work with your local veterinarian to plan treatment protocols for your llamas and alpacas. There are many factors to take into consideration when determining which drugs and what dosage to use in different situations. The information provided here is a basic guideline; specific treatments should be started only with the guidance of your veterinarian.

Due to lack of complete information, the dosages used in camelids are frequently taken from dosages used in sheep, goats, cattle and horses. However, several differences have already been discovered, for example antibiotics, as a general rule, appear to have a longer time of action in camelids compared to domestic ruminants. There also seems to be a difference in dosing between llamas and alpacas. These differences can be dangerous and result in fatal over-dosages if the drug mechanism is not understood, for example Panacur and Valbazen doses. The choice of which drug to use in certain situations is a complicated decision and should not be decided upon in a “cookie cutter” manner. The age, sex, pregnancy status and general health of the alpaca/llama should be taken into consideration when deciding which drug to use. The following information is on drugs commonly used in alpacas and llamas.

Abbreviations:

PO – orally, SC – subcutaneous, IM – intramuscular, IV – intravenous  
SID – once a day, BID – twice a day, TID – three times a day, QID – four times a day  
EOD – every other day, ETD – every third day, IU – international unit

How to calculate how many mL (same as cc) to administer:

Animal’s weight: 100 lbs  
Drug concentration: 50 mg/mL  
Dose of drug: 2 mg/lb

$100 \text{ lbs} \times 2 \text{ mg/lb} = 200 \text{ mg of drug needed}$   
 $200 \text{ mg} \div 50 \text{ mg/mL} = 4 \text{ mL of drug to administer}$

## Antibiotics

**A. Aminoglycosides** – Gentamicin (100 mg/mL), Amikacin (50 & 250 mg/mL) should only be used with extreme caution as they can cause death due to kidney failure if given for prolonged periods (>5 days in a row) by IV, IM or SC route. Kidney function should be monitored closely and the animals should only be given this drug class while supplemented with IV fluids. They can be used as part of an intrauterine lavage without risk of toxicity. **Gentamicin and Amikacin** – Amikacin is considered to be the safer of the two drugs in other species. Regardless of which form is used, a maximum 5 day, once daily dosing is the recommended means of administration systemically.

**Dose: 2 – 3 mg/lb, SC, IV, SID, for 5 days ONLY**

**B. Baytril 100 (Enrofloxacin – 100 mg/mL)** – commonly used to treat neonatal sepsis, upper respiratory infection, pneumonia, and uterine infections in camelids. It is labeled for treatment of respiratory disease

in beef cattle. It is considered to be a “big gun” and should not be used as a first choice antibiotic. In puppies (< 8 months), use of this drug is associated with cartilage damage in joints; it is unknown if the same is true for camelid crias. Use of this drug in cats has been associated with blindness with high doses and long term use; the same has been reported in a Guanaco after 26 days of therapy. Research has looked at oral absorption of this drug in camelids using double the injectable dose. There is absorption at 4.5 mg/lb, PO, SID but it is still preferred to give Baytril either SC or IV. It is considered to be a broad spectrum antibiotic, but does not work against *Streptococci*, *Enterococci*, *Actinomyces*, *Pseudomonas* bacteria or anaerobic infections.

**Dose: 2.3 mg/lb, SC, IV, SID to BID (IV route) (0.6 mL/25 lbs, 2.3 mL/100 lbs)**

**C. Biomycin 200, LA 200, Noromycin 300, Duramycin 300 (Oxytetracycline)** – used mainly for the treatment of *Mycoplasma haemolamae* (“Epe”) in camelids. It is a very irritating drug and should not be used IM. SC placement needs to be done carefully, alternating injection sites and thoroughly rubbing flat the drug under the skin (best done over the rib area). The brands **Biomycin 200, Noromycin 300 or Duramycin 300 are** much less irritating and are the **preferred** products. It is labeled for every other day use in cattle, but the researcher at Oregon State University recommends it be given every three days (ETD) for 5 treatments. In some cases of *M. haemolamae* it may take more than 5 treatments if the animal remains anemic. If it used IV, it must be given SID. I recommend for follow up to IV treatment, 3 treatments SC, 3 days apart.

**Dose: Biomycin 200, Noromycin 200 – 9 mg/lb, SC, ETD for 5 treatments (4.5 mL/100 lbs)  
Noromycin 300, Duramycin 300 – 9 mg/lb, SC, ETD for 5 treatments (3.0 mL/100 lbs)**

**D. Draxxin (Tulathromycin – 100 mg/mL)** – labeled for treating respiratory disease in many species. It is also considered a “big gun” as it is newer on the market of available antibiotics. With this in mind, it should only be used when other, more commonly used antibiotics have failed. It is more expensive than other choices, but has long duration of activity in other species, of which is undetermined in camelids. The dose used is the same as in other species. I have used this drug in limited situations; the animals did improve with no side effects noted.

**Dose: 1.1 mg/lb, SC, can be repeated in 10 days if no improvement. (1.1 mL/100 lbs)**

**E. Nuflor (Florfenicol – 300 mg/mL)** – commonly used to treat upper respiratory infection, pneumonia, and tooth root infections in camelids. It is a broad spectrum antibiotic that is labeled to treat respiratory infections in cattle and is given every other day (EOD). Based on information from a study done at Ohio State University, in alpacas, the best dosing regimen in alpacas is daily dosing and the IM route. Due to how the drug is metabolized (by the liver), it should not be given to young crias (less than 3 months old). Contraindicated to use with any other antibiotics. Can occasionally cause them to lose their appetite. Studies are to be conducted at Ohio State to look at proper dosing in llamas.

**Dose: 9 mg/lb, IM or SC, SID (1 mL/35 lbs, 3 mL/100 lbs)**

**F. Penicillins** – considered to be a very safe class of drugs that can be used at very high dosages if needed.

**1. Ampicillin** – comes as a SC form (Polyflex) and an IV form (Ampicillin sodium). Considered reasonable safe in most species. The IV form has a short duration in the blood and must be dosed several times a day.

**Dose: Polyflex: 10 mg/lb, SC, BID**

**Dose: Ampicillin sodium: 5 mg/lb, IV, TID to QID for Listeriosis**

**2. Excede (Ceftiofur Crystalline Free Acid – 200 mg/mL)** – a product labeled for respiratory infection in cattle and swine. It is intended to be administered as a one time treatment SC at the base of the ear in cattle and IM at the base of the ear in swine. Due to this unique location

of delivery of the drug, and the unique physiology of camelids, absorption may be unpredictable and no research has been done in camelids. Regardless of this, Excede has been used by many veterinarians in camelids with apparent success. When administered, it is important to confirm the needle is not in a vein (pull back on plunger to check for blood) as this drug will kill instantly if given IV. Excede is probably best reserved to use in animals that cannot be given injections every day. If needed, an additional dose can be repeated on day 4 if your veterinarian has determined it is appropriate.

**Dose: 3 mg/lb, SC, can repeated on Day 4 (1.5 mL/100 lbs)**

- 3. Naxcel, Excenel (Ceftiofur – 50 mg/mL)** – commonly used to treat neonatal sepsis, upper respiratory infection, pneumonia, retained placenta and uterine infections. Naxcel can be used IV or SC. If used IV, must be given BID. With severe infections and SC usage, can also use BID. Excenel has the same parent drug as Naxcel, just a different carrier that allows it to be kept at room temperature, with a long expiration date; it should be given only SC.

**Dose: 2 mg/lb, SC, IV, SID to BID (1.0 mL/25 lbs, 4 mL/100 lbs)**

- 4. Procaine Penicillin G (300,000 IU/mL)** – the **only** concentration available (do not use the Benzathine form). Commonly used to treat tooth root infections, skin infections/wounds, infected foot pads, umbilical infections and follow up treatment for Listeriosis (bacterial infection in the brain). Best choice to use if Clostridium infection is suspected. Not a good choice for Upper Respiratory Infection or Pneumonia. Anaphylactic shock (respiratory failure and collapse) can occur on occasion and must be treated immediately with Epinephrine (1 mL/100 lbs, IM) to prevent death. If this happens, do not use this drug again in that animal.

**Dose: 10,000 IU/lb, SC, BID (0.8 mL/ 25 lbs, 3.5 mL/100 lbs)**

**OR      \*\* Dose: 20,000 IU/lb, SC, SID (1.6 mL/25 lbs, 7 mL/100 lbs)**

**G. Sulfa drugs** – The **ONLY** use for Sulfa drugs in camelids is for the treatment of intestinal coccidia. The use of Sulfa drugs must be used with caution as a potentially fatal complication called Polioencephalomalacia can occur. Polioencephalomalacia is a condition where there is a sudden lack of Vitamin B1 in the first compartment and causes subsequent softening of the brain. This results in neurologic signs – most notably blindness. Normally this condition can be treated by administering Thiamine (Vitamin B1), but when the condition is caused by Sulfa drugs, it is non-thiamine responsive and is usually fatal.

- 1. Albon (Sulfadimethoxine)** – comes in different concentrations and this will determine the amount to be given. See above calculation for example.

**Dose: Day 1: 25 mg/lb, PO, SID      Day 2-5: 13 mg/lb, PO, SID**

- 2. SMZ, TMS, TMP (Trimethoprim-sulfamethoxazole)** – is **NOT** effective orally in adults and ruminating crias (> 30-45 days), this has been proven conclusively by two scientific studies.

**Dose: 13 mg/lb, PO, BID (Dose base on the Sulfamethoxazole portion)**

**Anti-inflammatory, Analgesics (pain management)**

**A. Banamine (Flunixin meglumine – 50 mg/mL)** – this is a non-steroidal anti-inflammatory drug used to treat pain, inflammation and endotoxemia (toxins in the blood from bacterial infections). It does not have properties to directly cause calmness, except as what would be expected by the relief of pain. If used for long term, it may lead to ulcers in the third compartment. It should also be used with caution in dehydrated camelids as it can damage the kidneys. In dehydrated animals, use one-half dose until the animal is fully hydrated. Depending on the reason it is being used, once a day seems to be clinically adequate. If the animal becomes painful again after 12 hours, an additional dose can be given for short term use. To avoid severe side effects it is best if the animal is fully hydrated (possibly on IV fluids). It is not effective if used orally.

**Dose: 0.23 mg/lb – 0.5 mg/lb, IV, IM, SC, SID to BID (0.5 – 1 mL/100 lbs)**

**B. Etogesic (Etodolac – 300 mg tablets)** – this is an oral non-steroidal anti-inflammatory drug used to treat pain, primarily pain of bone origin. It is a drug used mainly in dogs. I have used it in cases of bone injury after repair and the animal is still painful and having a hard time getting around. It can also be used if there is a non-specific lameness, once it has been determined by X-rays that there is not a repairable injury present. As we do not know if it causes ulcers, I recommend to use it SID for 7 days, then EOD for another 2 to 3 weeks if needed. If the pain seems controlled on EOD, then reduce to two times a week.

**Dose: 4.5 mg/lb, PO, SID for 7 days, then decrease to EOD**

**C. Ketoprofen (Ketofen)** – this is a non-steroidal anti-inflammatory drug used mainly in horses and dogs. Minimal research has been done on camelids and it is used very little clinically. It has a very short duration of action. As there are other, effective anti-inflammatory drugs available, probably not a good choice to use unless your veterinarian has experience with the drug.

**Dose: 0.9 mg/lb, IV, IM, SC**

**D. Meloxicam (7.5 & 15 mg tablets)** – a drug used in small animals and horses for pain management. Recent research in llamas has provided data to indicate its usefulness in camelids. Many veterinarians have been using it in the field based on experience with other animals. The data indicates the drug stays in the blood for 3 days. More studies will have to be done to confirm if pain control will last that long.

**Dose: 0.5 mg/lb, PO, q 2 days      Can be used daily if indicated**

**E. Phenylbutazone “Bute”** – based on research, probably not useful in camelids

#### **Anti-Ulcer medications** (in order of importance)

**A. Protonix (Pantoprazole)** – a human drug that has been studied in alpacas that blocks the cells that produce acid in the third compartment. This makes the pH higher and helps ulcerative tissue heal. Can be given IV or SC and the action of the drug will last for 24 hours. It comes in 40 mg vials that must be rehydrated with sterile saline before use. **Due to the known effectiveness and only once a day dosing it is a good choice to use if gastric ulcers are suspected.** Over the last few years, the cost of this drug has come down and is more reasonable. Once a vial is mixed, it is stable for 96 hours (refrigerated, researcher comment)

**Dose: 1 mg/lb, IV or SC every 24 hours**

**B. Carafate (Sucralfate – 1 gram tablets)** – a drug that works in an acid environment to bind to ulcerated tissue in the third compartment. Can be given BID to QID. If it is used in combination with Cimetidine, the Carafate must be given 1 to 2 hours BEFORE the Cimetidine. Only clinical impression that it “seems to help”.

**Dose: 1 gram/50 lbs, PO, BID to QID**

**C. Cimetidine HCl injection** – blocks the cells that produce acid in the third compartment and makes the pH higher and helps ulcerative tissue heal. Can be given IV or SC. Must be given 1 to 2 hours AFTER Carafate is administered. It has a short duration of action and can be given BID to QID. May need to be compounded due to limited availability. Not a good choice for treatment of ulcers.

**Dose: 4.5 mg/lb, IV, SC (1.5 mL/ 50 lbs)**

**D. Gastroguard (Omeprazole)** – **DOES NOT WORK orally in camelids that are old enough to chew their cuds!!** For young crias, can use 1 to 2 clicks, twice a day. It is effective if given IV. It is not available commercially in that form and your veterinarian would have to have it compounded.

**Dose: 0.2 – 0.4 mg/lb, IV, QID**

### De-worming drugs

**A. Antiprotozoal** – products used in camelids to treat protozoal parasites such as *Coccidia*, *Cryptosporidium* spp, *Giardia*, *Balantidium coli*.

1. **Baycox<sup>®</sup> (Toltrazuril 50 mg/mL)**, the parent drug to Ponazuril, not approved for use in the United States has been used for several years by camelid owners for the treatment of E.mac. Information provided to the author by Bayer demonstrated good absorption in cattle with only one dose. Suggesting this drug, made for piglets, would also work to treat E.mac.

**Dose: 9 mg/lb (1.8 mL/10 lb), PO, once**

2. **Corid (Amprolium)** – used as individual and group medication for treatment and prevention of coccidia in camelids. Keep in mind that it is normal to find some regular coccidia in adult feces. Only treat adults if they are having clinical disease (severe diarrhea) to regular coccidia. Over-dosage and prolonged use of this drug can also induce Polioencephalomalacia, however it is Thiamine responsive. When treating a group, must be the only source of water available. Is **not** a suitable treatment in the water for young crias, as they do not drink enough water to medicate themselves. Follow label directions, do not just add drug to remaining water, pour out remaining water and give fresh daily.

**Dose: 1 oz/5 gallon water**

**4 oz/25 gallon water**

**8 oz/50 gallon water**

**Individual dosing (using the 9.6% concentrate): add 1.5 oz of drug concentrate to 4 oz of water, give 7.5 mL/100 lbs of the mixture. Can add flavoring. It should be made up fresh every day, give daily for 5 days**

3. **Humatin (Paromomycin Sulfate – 250 mg capsules)** – used to treat *Cryptosporidium* diarrhea in young crias. If a severe case, use double dose and double the days of treatment. It comes in capsule form that will need to be taken apart and the powder mixed with water in a syringe. This is a human drug and expensive, but it is the most effective treatment for *Cryptosporidium* diarrhea. This drug available to your veterinarian at Cornerstone Pharmacy (877 – 581 – 8828).

**Dose: 11 – 22 mg/lb, PO, BID, for 5 to 10 days (1 capsule/20 lbs)**

4. **Marquis (Ponazuril – 150 mg/mL)** – used to treat *Eimeria macusaniensis* (E. mac) infection in camelids. No research has been done yet on the efficacy of Ponazuril on E. mac in camelids; however research has been done to demonstrate that it is well absorbed in llamas. The researchers did not look at the absorption in smaller camelids using small doses straight from the tube, but felt that the variability would be more likely due to inconsistent absorption from the first compartment rather than the distribution of the drug within the tube (personal communication). Merial, now owners of Marquis, said that no studies have been done to randomly determine the distribution of the product in the tube, but commented that as one tube is

a multi-day regimen for horses it should be adequate. It is also effective on regular coccidia and is the preferred drug of choice to use in adults with coccidia. There is clinical evidence that this drug may also work against *Cryptosporidium* diarrhea in crias. If you choose to dilute Marquis, the recipe for dilution is to take 40 mL of the drug and add 20 mL of distilled water, mix well. This makes a 100 mg/mL suspension. Mix the whole tube up at once to ensure all the drug is well distributed. One tube makes 3 dilutions. For larger animals, it can be used straight from the tube, only one dose needed.

**Dose: Dilution 100 mg/mL – 9 mg/lb, PO, SID for 3 days (9 mL of dilution/100 lbs)  
Undiluted 150 mg/mL – 9 mg/lb, PO, once (18 mL of paste/300 lbs)**

5. **Metronidazole (Flagyl)** – used to treat *Giardia* diarrhea in young crias, should not be used in crias > 2 months of age.

**Dose: 23 mg/lb, PO, BID for 5 to 8 days**

**B. Avermectins** – the two most common in this class are Ivermectin and Dectomax, they are not effective on Nematodirus, Whipworms, Capillaria and Tapeworms. May still work on some farms with simple Strongyle type infections, but unlikely. Best when used to prevent Meningeal worm infection. Should always be given SC, not effective as Meningeal worm prevention if given orally or topically. Limited effectiveness with Chorioptic mange infection as the mite lives on the surface of the skin, will work on Sarcoptic mange. These drugs can be started in crias that are actively grazing (2 to 4 months) as prevention of Meningeal worm infection. Newer in this class is Cydectin (see below).

1. **Cydectin (Moxidectin 1mg/mL)** – is a milbemycin de-wormer. It binds with specific chloride ion channels in the nerve and muscle cells of the parasite resulting in paralysis and elimination of the parasite. Cydectin comes in three forms: oral, injectable and topical. Research has shown the topical form does NOT work with camelids. The oral sheep drench is the recommended form to use in camelids following the dosing chart for sheep. This drug should be reserved for use on farms that have Benzimidazole resistant strongyle type parasites. Just like any other de-wormer, over or inappropriate use of this drug will result in development of resistance. It has a moderate degree of safety and can cause seizures with a 2X label overdose that may not resolve. It is labeled for sheep 4 months and older, which until more information is known in camelids, should be followed with crias. Reproductive safety has not been determined yet in the US. For llamas, can consider using the equine product (Quest gel). Keep in mind that one tube of gel is enough to treat an 1150 lb horse. Make sure the dialing ring is locked to avoid overdosing. **Both products can cause coughing after administered**

**Cydectin: 0.18 mg/lb, PO, Once (10 mL/55 lbs, 18 mL/100lbs of sheep drench)  
Double the dose on chart on Sheep drench**

**Quest gel: 0.18 mg/lb, PO, Once (2.7 mL/300 lbs) (Use only in adult llamas, too concentrated for safe use in alpacas)**

2. **Dectomax (10 mg/mL)** – longer duration of action, need to use higher dose, stings when administered so change needle after drawing up the drug. Adult alpacas 4 mL, adult llamas 9 mL

**Dose: 2.5 mL/100 lbs, SC, every 45–60 days for Meningeal worm prevention**

3. **Ivermectin (10 mg/mL)** – shorter duration of action, stings when administered so change needle after drawing up the drug. Dosage 0.2 mg/lbs. I usually give adult alpacas 3 mL, adult llamas 8 mL

**Dose: 1.8 mL/100 lbs, SC, every 30–45 days for Meningeal worm prevention**

C. **Benzimidazoles** – some products have been in use for a long time and in some parts of the country have lost efficacy. Also, there is a wide range of safety, see below for specifics.

1. **Panacur/Safe-guard (Fenbendazole – 100 mg/mL)** – has the widest range of safety, can be used at very high doses. May not always be effective in all animals and in some parts of the country. To make it more effective, give at the high dose, remove feed the night before administering AND/OR give BID. Can also be used at 23 mg/lb, PO, for 5 days for the treatment of Tapeworms and Giardia diarrhea in crias. Also use at 23 mg/lb, PO, for 5 days for Whipworms and Capillaria. Is very safe to use in pregnant females. Will always be effective as treatment for Meningeal worm infection (23 mg/lb, PO, for 5 to 10 days). With such wide spread parasite resistance; use the **high end of the dose as a routine**.

**Dose: 9 – 23 mg/lb, PO, SID to BID for 3 to 5 days (9 to 23 mL/100 lbs)**

2. **Valbazen (Albendazole – 113.6 mg/mL)** – has a very narrow margin of safety, should not be used in young crias (< 6 months old) as it can cause fatalities due to liver failure. DO NOT USE in pregnant females, can cause facial deformities in crias. Due to toxicities with over dosing, you MUST always obtain an accurate body weight and should never use Valbazen in the same animal on consecutive days.

**Dose: 9 mg/lb, PO, Once and repeat in 5 - 7 days if needed in severe infections (8.0 mL/100 lbs)**

D. **Levamisole – Prohibit<sup>®</sup> powder**) – works by paralyzing the parasite, which is then expelled alive. It has been used in cattle, sheep and goats for many stomach and intestinal worms, although not effective with *Trichuris* spp and Lungworms. If used as the injectable form or a high dose orally, there may be neurologic side effects. It has a narrow margin of safety and should not be used in debilitated animals unless the benefit outweighs the risk. It is generally considered to be safe to use in pregnant animals, again taking into consideration the benefit versus the risk. This drug should be used only as a last resort, only after more commonly used drugs (Panacur, Valbazen, Cydectin) have failed. An exception would be in very anemic (white or pale pink mucous membranes) animals. As a note, this drug is no longer consistently commercially available, but is available to your veterinarian at compounding pharmacies.

**Dose: 4 mg/lb, PO, Once – compounded product**

**Prohibit<sup>®</sup> powder** - weigh out 3 g powder and add 60 mL of water. This is 44.7 mg/mL concentration. 10 lb = 0.8 mL, 50 lbs = 4 mL, 150 lbs =12 mL, 250 lbs=20 mL

Stable for 90 days, at room temperature. Credit: UGA Pharmacy

**Should be repeated in 7 to 10 days to get the newly emerged adults as the drug does not kill the existing larvae already in the animal.**

**Can cause coughing after administered**

E. **Pyrantel pamoate suspension (50 mg/mL), Strongid Paste<sup>®</sup>**) – works by paralyzing the parasite and is effective in horses, cattle, sheep, goats and swine against many parasites. There is minimal research done in camelids, but has been used clinically and seems to be effective. Since it is not frequently used, this drug should be held in reserve for when other, more commonly used drugs no longer work. The suspension is safer to use as it can be dosed more accurately. It has a moderate margin of safety, and should not be used at the same time as Levamisole.

**Dose: Suspension: 6 - 8 mg/lb, PO, Once (12 - 16 mL/100 lbs)**

**Paste: 5 mL paste/100 lbs [180 mg pyrantel base/mL].**

**Should be repeated in 7 to 10 days to get the newly emerged adults as the drug does not kill the existing larvae already in the animal.**

## Miscellaneous Drugs

**A. Bo-Se (Vitamin E & Selenium 1 mg/mL)** – used in crias as a prevention of white muscle disease (Selenium deficiency) and to stimulate the immune system. Also can be used as a general supplement in underweight and geriatric camelids. Research has shown that Selenium absorption was rapid after injection and did not stay in the system very long. No information about use during pregnancy is available; however it is routinely used in pregnant cattle. Be very careful only to use the Bo-Se product as Selenium overdoses occur and can be toxic. Anaphylactic reactions have been known to occur, so the animal should be monitored for respiratory failure and collapse after administration.

**Dose: 0.025 mg/lb (1 cc/40 lbs of Bo-Se), SC**

**B. Clostridium type C, D & T toxoid (CD&T injection)** – most commonly used vaccine in camelids. Mainly used to prevent tetanus. Unless a specific problem in your area, the “8-way vaccine” is not recommended. Many different protocols exist, no research on best way! This is what I recommend:

**Day 2: 2 mL, SC    Day 30, 60, 6 months, yearly: 3 mL    Dams: 3 mL, 2 days after giving birth**

**C. Epinephrine 1:1000 (1 mg/mL, Large animal form)** – animals can have anaphylactic and allergic responses to drugs and insects bites the same as humans. Any drug can be responsible and animals should be monitored for 20 to 30 minutes for signs of adverse response after any injection are given. Signs such as staggering, difficulty breathing, hives developing around the injection site, collapse. Penicillin, as in humans, is a common culprit, but vaccines and even vitamin injections can cause reactions. **The first thing to do if you find an animal showing any suspicious signs is to call your veterinarian.** Tell them you have Epinephrine on the farm and they will instruct you further. If your veterinarian is not available, then administer **1 mL/100 lbs, IM** and monitor their breathing. If after 15 minutes there is no improvement, then give one additional dose. During this time keep trying to contact your local veterinarian and keep the animal in cush position.

**D. Imodium** – to help control severe diarrhea in crias and adults, to be used with Kaolin. These are estimated doses, each animal needs to be monitored for what works for them.

**Dose: Young crias – 3 mL, SID to BID as needed  
Older crias – 4 to 5 mL, SID to BID as needed  
Yearlings – 5 to 7 mL, SID to BID as needed  
Adults – 7 to 10 mL, SID to BID as needed**

You can mix Kaolin and Imodium together in one container (3 part Kaolin: 1 part Imodium) for convenience. Use the Kaolin dose amounts listed below.

**E. Iron Dextran** – for use with anemic camelids, can be used in conjunction with Vitamin B<sub>12</sub>. Iron is very irritating and will cause lameness if given IM, so only inject SC. To make the injection less irritating, the iron can be diluted using equal parts sterile saline. Iron can cross the placenta, so unless the life of the dam is at risk, should not be used in pregnant camelids. Iron is not readily eliminated from the body, so overdosing can be toxic. Oral iron supplementation alone is not effective in the treatment of iron deficiency anemia. On occasion anaphylactic reaction can occur. No research has been done on the correct dose in camelids. The dose listed was obtained from a published article about treatment of iron deficient llamas. Also, this dose has been used clinically without apparent problems.

**Dose: 300 mg (alpaca adult), 500 mg (llama adult) SC, every 3 days for 3 treatments**

**F. Isoniazid (300 mg tablets)** – for use in combination with antibiotics (i.e. Nuflor OR Penicillin G) for chronic infections. Most commonly used to treat tooth root abscesses or lumpy jaw. Helps antibiotics penetrate the abscess capsule. Needs to be used long term for best results. May be special order.

**Dose: 5 mg/lb, PO, SID for 30 days**



**G. Kaolin Pectate** – to help control moderate diarrhea in crias and adults. These are estimated doses, each animal needs to be monitored for what works for them.

**Dose: Young crias – 5 to 7 mL, SID to BID as needed**  
**Older crias – 7 to 10 mL, SID to BID as needed**  
**Yearlings – 12 to 15 mL, SID to BID as needed**  
**Adults – 20 to 30 mL, SID to BID as needed**

**NOTE: it is important to determine the cause of diarrhea and not just stop the diarrhea**

**H. Oral supplements** – there are many, many oral vitamin and mineral supplements. Few if any have been researched in camelids, even the ones labeled for camelids. Be careful of the products that contain Copper as they can be toxic/accumulative over time, like Red Cell. The products labeled for sheep and goats are probably safe to use in camelids. Some products claim to help with weight gain, and in non-ruminants, they may be correct, but products high in fat will not help camelids as they do not digest fats in the same way of simple stomach animals. One product, Alpaca and Llama Nutri-Drench by Bovidr Laboratories seems to be a safe product and although will not specifically help them gain weight it has vitamins and minerals that many debilitated animals may be lacking. Follow the manufactures directions.

**I. Thiamine (Vitamin B1)** – used for the treatment of Polioencephalomalacia and any neurologic disease. Should only be used with direction from your veterinarian. Concentrations vary with different products, so calculate amount to be administered carefully. Can cause neurologic signs if too much is administer IV rapidly. Must be used with extreme caution if given IV as it can cause seizures. Start with lower dose, increase only if the animal is not responding (still depressed, blind).

**Dose: 9 – 18 mg/lb, SC, SID to QID**

**J. Vitamin A & D** – used routinely in crias to help prevent rickets and leg angulation. Do not overdose as can cause organ failure. Injectable form is more consistently absorbed than oral form, but either form is effective. Repeat injectable form every 60 days, repeat oral form every two weeks. **DO NOT** use both forms! There are many products available so the dose needs to be calculated carefully based on the product used. Always ask your Veterinarian if you have questions prior to dosing. The dosage needs to be calculated based on the Vitamin D concentration in the product. Dose until 1 to 2 years old.

**Dose: 1,000 IU/lb, SC, every 60 days OR**  
**33,000 IU, PO, every 2 weeks**

**K. Vitamin B<sub>12</sub>** – for use with anemic camelids. Can be used in conjunction with Iron Dextran as Vit B<sub>12</sub> helps the body absorb iron. Concentrations vary with different products. As with many medications in camelids, there is no labeled dose, however it has been used clinically for many years in camelids with no apparent problems. As a comment, it is a bright red liquid. At the end of the treatment, recheck the Packed cell volume (PCV) to confirm improvement of anemia.

**Dose: 3,000 mcg (alpaca adult), 5,000 (llama adult), SC, daily for 7 days, then three times a week for 3 weeks**

There are **three drugs** I recommend for every farm to have readily available: **Banamine, Thiamine and Epinephrine**. As with all medications, they should NOT be stored in the barn unless you have a temperature controlled area. Medications that undergo freezing or extreme heat are more likely to cause problems and/or not be effective. Frequently you will not use the majority of the medications before they expire. With that in mind, do not have a pharmacy of everything, just the one most commonly used.

In conclusion, as stated above, I have provided this information to be a helpful guideline only. It is NOT meant to replace your local veterinarian. Many of the drugs listed, even the nonprescription ones can have fatal consequences if used inappropriately. The information is correct to the extent that information is available. Please share this information with your veterinarians. If you have any questions, please ask your local veterinarian or call Dr. Walker at 419 – 306 – 9522.

### **References**

Antimicrobial agents and South American Camelids – Developing rational treatment protocols. Lakritz, Jeff, 2008 International Camelid Health Conference for Veterinarians, 44 – 55.

Antimicrobial drug use in New World Camelids, Cebra, Chris. In: Antimicrobial therapy in veterinary medicine. 4<sup>th</sup> Edition, 2006. Chapter 33, 529-534.

Drug therapy in Llamas and Alpacas, Fajt, Virginia. In: Llama and Alpaca Care. 2014. Chapter 34, 365-378.

Plumb's Veterinary Drug Handbook, 6<sup>th</sup> and 8<sup>th</sup> Edition

Dr. Pam Walker, personal observation