

PARASITOLOGY

Parasites are one of the most important considerations in the overall health of the Alpaca. It is imperative to learn what are the common parasites that are common to your particular area by consulting with local veterinarians and other livestock owners. A parasite prevention program should be based on what parasites actually exist at a significant risk and not on rare parasites that are never seen in your area.

The number of animals that share a common pen space and the higher density of animals that are kept together in the same pen present a higher risk for parasites and other infectious diseases.

Since oral ingestion is how most intestinal parasites gain entry into a host, pasture grazing represents a higher risk of exposure than dry lot feeding. It is important to practice pasture rotation management to reduce the parasite exposure and to prevent over grazing. Sharing the pasture with other animal species such as sheep and goats can also increase the parasite risk. There are several intestinal parasites that are shared between sheep, goats and camelids.

In dry lot management controlling parasites and other infectious agents may be easier especially if the dung pile is cleaned out regularly.

Coccidia are a protozoan parasite most commonly seen in young crias less than one year of age. It can be considered a normal juvenile event and may only present itself as a mild diarrhea. Treatment may not be needed unless the diarrhea becomes severe.

Alpacas that are thin or in poor condition may represent animals with a heavy parasite load and in their stressed state are more susceptible to parasite infestation. Animals that are sick will often be positive for parasites but it may not be the only reason the animal is ill.

Frequency of worming should be decided on the risk factors and number of animals owned. On a very small herd of 2 to 4 animals worming twice yearly may be all that is needed. With 4 to 8 animals three wormings may be needed. Alpaca herd of 8 or more may need wormings of every three months.

It is important to have your herd checked for internal parasites by running a fecal exam on a regular basis. This needs to be done not only when animals are having diarrhea but periodically on selected individuals of a herd. If the size of the herd is small every individual can be done while on larger herds this may not be practical and only a few representative animals selected. A representative of each production stage should randomly selected. Young pre-weanling cria, yearling cria, pregnant females, adult males and older geriatric alpacas.

A fecal submitted just before worming and 2 weeks after worming will be an excellent way to judge parasite control effectiveness.

Gastrointestinal nematodes

Parasites found primarily in the rumen third compartment are *Camelostrongylus mentulatus*, *Ostertagia ostertagi*, *Teladorsagia circumcincta*, *Trichostrongylus axei*, *Marshallagia marshalli* and *Haemonchus* sp.

The strongylus worm is the most often observed and larval migration of this and other parasites can cause gastritis. These parasites do not generally cause death but they can be debilitating.

Small intestinal parasites include *Trichostrongylus* sp., *Nematodirus* sp., *Cooperia* sp., *Capillaria* and *Strongyloides*. Most of these parasites although encountered frequently on camelid parasitology exam are not considered pathogenic unless are present in high numbers. [1]

Parasites found in the cecum and colon include *Oesophagostomum venulosum* and *Trichuris* sp. *Trichuris tenius* is the predominant camelid whipworm

Clinical symptoms of camelids infested with gastrointestinal parasites are most dramatically seen in young alpacas. They can be poor growth, diarrhea, anemia, dehydration and emaciation. Anthelmintics used to treat gastrointestinal parasites include Ivermectin, Fenbendazole, Levamisole, Thiabendazole, Pyrantel pamoate and Mebendazole.

Table Anthelmintics[8]		
Fenbendazole	(Panacur)	11 - 15 mg/kg PO 1 - 3 days
Ivermectin	(Ivomec)	.2 mg/kg SQ 1 day
Thiabendazole	(Omnizole)	55 - 110 mg/kg PO 1 - 3 days
Levamisole	(Levasol)	5.5 - 8.5 mg/kg PO or SQ 1 day
Mebendazole	(Telmin)	22 mg/kg PO 3 days
Albendazole	(Valbazen)	6.5 mg/kg PO 1 day
Clorsulon	(Curatrem)	6.5 mg/kg PO 1 day
Praziquantel	(Droncit)	2.2 - 3.3 mg/kg PO or SQ 1 day
Pyrantel	(Strongid - T)	8.5 mg/kg PO 1 day

Ivermectin and Fenbendazole are considered the safest and most effective of the anthelmintics used on camelids [2].

When selecting an anthelmintic you need to consider the effectiveness of the medication toward a particular parasite. Fenbendazole is more effective against *Trichuris* than Ivermectin.

Lungworm

Dictyocaulus is the lungworm parasite common with sheep and cattle. It is contracted by grazing on pasture with the infective larvae. Camelids sharing pasture with sheep and cattle are at risk for this parasite. Mature worms living in the nasal passages are coughed up and swallowed. The worms are passed through in the feces as larvae. If this parasite is suspected a fresh fecal should be obtained rectally or immediately after defecation and look for lungworm larvae. Fenbendazole, levamisole and ivermectin are all effective against lungworms.

Meningeal Worm

Parelaphostrogylus tenuis is the meningeal worm found in North America. The natural host for this parasite is the white tailed deer. Alpacas sharing the same grazing area with the white tailed deer are at risk to contract this parasite. In the white tailed deer the adults develop in the cranial subdural space and venous sinus. The female worms will lay eggs and after developing into larvae, they will travel via the bloodstream to the lungs. They are then coughed up, swallowed and passed in the feces. The larvae are further developed into infective larvae in snails. The infective larvae are ingested by the alpaca while grazing. In the white tailed deer the meningeal worm does not cause any serious harm. While in the alpaca or llama the parasite can be life threatening.

In the camelid the adult meningeal worm larvae will wander into the spinal cord and brain tissue causing damage to the central nervous system. Clinical signs are often unilateral and include head tilting, neck arching, in-coordination, trouble getting up and weight loss. Affected animals need to be treated ASAP, see chapter 18 that covers the meningeal worm in more detail. This is a parasite that you do not want to wait until clinical symptoms appear and then treat. Take all steps to reduce exposure to this parasite. Avoid pastureland shared with the white tailed deer, avoid damp wet pasture areas that may be a prime habitat for snails and administer ivermectin periodically at .4mg/lb as a preventative measure.

Tapeworms

Monezia is a tapeworm also found in camelids, sheep and cattle. It is believed to cause very little harm but it can be very dramatic in appearance. The tapeworm will be passed in large quantities and often gets a dramatic reaction from the owner. The treatment usually consist of administering fenbendazole at triple the normal dose. A second round of treatment may be needed in 2 weeks or even higher doses of fenbendazole may be needed.

Live flukes

Fasciola hepatica and *Fasciola magna* is the liver fluke that effects alpaca and llamas. The adult fluke reside in the bile duct of an infected animal. The eggs are passed down the bile duct and into the intestinal tract. The eggs are shed in the feces and need to be deposited in damp water conditions for further maturation. The snail becomes a biological vector for the infective larvae to further develop. The larvae are ingested while grazing on wet pasture from there it finally migrates to the liver after a prolonged period of time. Diagnosis of liver flukes is made by demonstrating the presence of eggs in the feces or by performing an ELISA test that can indicate an infection 2 weeks after larvae exposure and before the fluke matures in the liver. [3] Treatment is usually done with Clorsulon 6.5 mg/kg PO but the effectiveness of this medication is not established.

Eye worms

Thelazia sp. Is the eye worm that affects alpaca eyes. The nematode may be seen swimming on the surface of the eye and residing in the conjunctiva sac. This parasite is transmitted by flies and is most prevalent during the fly season. With a large number of eye worms conjunctivitis may develop. Application of ivermectin drops into the conjunctival sac is an effective treatment for eye worms. [4]

Protozoan parasites

Coccidia

Eimeria sp. is responsible for a prevalent diarrhea seen in young crias less than one year of age. Many crias may contract coccidia showing very little clinical signs. Under crowded conditions, poor nutrition, cold, travel, weaning and other stresses coccidia may present as an acute diarrhea when exposed to the parasite. If the diarrhea is very mild or not present at all it is recommended not to treat coccidia. In more severe cases Albon or Amprolium are used to treat coccidia diarrhea. Management is the key in controlling this parasite. Good diet, avoid overcrowding, clean environment, and reduction of stress will control this parasite to subclinical status.

Table Coccidial drugs[9]		
Prevention		
Amprolium	(Corid)	5 mg/kg PO 21 days
Decoquate	(Decox)	.5 mg/kg PO 28 days
Therapy		
Sulfadimethoxine	(Albon)	55 mg/kg SQ day 1
		22.5 mg/kg SQ day 2 - 5

Toxoplasmosis

Toxoplasmosis gondii is the protozoan parasite responsible for toxoplasmosis. Toxoplasmosis usually presents itself as a cause of abortion in the last trimester of pregnancy. The alpaca is exposed to the parasite by ingesting hay or pasture contaminated with cat feces that contains the infective oocysts. Young cats will shed the infective oocysts for 2 weeks in the feces after exposure to Toxoplasmosis from eating rodents. Keeping young cats out of the hay barn or axis to the pasture may help to prevent Toxoplasmosis. There is no treatment for Toxoplasmosis in camelids.

Mites

Sarcoptes, Chorioptes and Psoroptes are the mange mites that effected camelids skin and ears.

Sarcoptes skin lesions usually begin on the legs and then spread to all over the body. The lesion will first show up as a red papule but then quickly change to a profound deep crusty scaling skin lesion and wool loss over the body. The mite deeply burrows into the skin. Deep skin scrapings are needed to find the mite. Treatment with ivermectin 0.2 mg/kg SQ twice 2 weeks apart is usually effective. All animals having contact with the infected animals need to be treated since the parasite is highly contagious.

Chorioptes mange are mites found on the surface of the skin. The skin lesions will appear on the feet and on the base of the tail. The mange may spread to other parts of the body but at a slower rate. There will be much less itching and usually does not cause wool loss. The mite is easier to find in a skin scraping because the mite is on the skin surface. It needs to be differentiated from the Sarcoptes mange mite and treated differently. Ivermectin is not as effective towards Chorioptes mange mite. Chorioptes is difficult to eradicate from a herd and needs to be treated aggressively. Several types of treatment can be tried. A 2% to 3% lime sulfur spray used weekly for 6 weeks. Coumaphos as a dip or spray every 2 to 3 weeks or a combination of ivermectin and DMSO is applied topically. [5] The treatment may need to be done several times to finally clear up the infection.

Psoroptes is the ear mange seen in alpacas. It is restricted to the ear and ear canals. The ear will become very itchy and develop a large amount of earwax that has a bad odor. The mite can easily be found by making a smear of the ear discharge. Treatment is done by cleaning out the excess earwax debris and placing 0.5 ml of ivermectin into each ear two weeks apart.

Lice

Damalinia breviceps the biting lice and Microthoracius minor the sucking lice are found on camelids. Lice are species specific and will not infect other non-species. Lice are found near the surface of the skin and can be seen with the naked eye. The biting lice will have a blunted head while the sucking lice will have an elongated head. A microscope is needed to make positive identification.

The shoulder area, lateral thigh and along the sides of the animal are the most likely place to find lice. You need to part the hair and very carefully look small moving lice near the skin level. It may closely resemble debris on skin. The animals may or may not have itchy skin. If sucking lice are found treat all exposed animals with ivermectin 0.2 mg/kg SQ twice 2 weeks apart. Biting lice will require a topical organophosphate pour on product such as fenthion (Tiguvon) twice 2 weeks apart. Dusting with Carbaryl is also effective but labor intensive.

It is important to control lice infestation by preventing exposure to the lice. Careful screening of new animals arriving to your farm will help to reduce lice exposure.

Ticks

Otobius megnini the spinose ear tick is found in the ear canal of alpacas. Head shaking and ear flagging are the common clinical signs. They can cause a lot of ear inflammation. The adult tick will lay several hundred eggs in the surrounding barn or feeding areas. The eggs will hatch into 6-legged larvae and find a host. The larvae will find the ear and may reside there for 7 months molting twice then drop to the ground to lay eggs. Treatment consist of manually removing the ticks with alligator forceps or apply mild ear insecticide and ivermectin 0.2 mg/kg SQ. Barn areas and feeding may need inspection and cleaning if the tick problem becomes recurrent.

Dermacentor sp. has been identified as the tick causing tick paralysis. The female tick feeding on a host may emit a neurotoxin causing paralysis. This tick resides primarily in the western United States. The paralysis begins as a rear leg weakness, difficult walking and knuckling over at the feet. The weakness will progress to a flaccid paralysis involving the legs, throat and facial muscles. [6] If the tick does not get removed or fall off the animal will die as the muscles of respiration, chewing and swallowing are affected. It may be a challenge to find a tick under all the wool and shearing the entire animal may be needed. Once the tick is removed the animal can return to normal in as short as 2 hours. Ivermectin should not be the sole treatment of tick paralysis as it may take several days to kill a tick.[7]

Nasal Bot

Cephenemyia sp. is the fly larvae that causes nasal bot. The primary host for the nasal bot is the deer but it can also affect camelids as well. The adult fly will lay eggs at the nasal opening and the hatching larvae will migrate up the nasal passages and into the nasal pharynx area. The larvae will develop into pupae in the deer and eventually be sneezed out. Alpacas that contract the nasal bot will develop a lot of nose and throat irritation that leads to sneezing, coughing, gagging and sometimes difficult breathing. Seeing the parasite in the nose is very difficult to witness and can only be done endoscopically or sometimes with

radiographs. Treatment consist of ivermectin double the normal dose 0.4 mg per kg body weight SQ. A second treatment in 2 to 4 weeks may be needed.

[1] Rickard, LG: Parasites. Veterinary Clinic of North America Food Animal Practice 10:2 420, 1994

[2] Cheney, JM and Allen, GT: Parasitism in Llamas. Veterinary Clinic of North America Food Animal Practice 5:1 218, 1989.

[3] Rickard LG: Development of a dot - ELISA test for the detection of serum antibodies to Fasciola hepatica antigens vin llamas. Vet Parisitology 1994 (in press)

[4] Fowleer ME: Parasites. In Medicine and Surgery of South American Camelids. Ames, Iowa State University Press, 1989, p 132.

[5] Rosychuk,RAW: Llama Dermatology. The Veterinary Clinics of North America 1994 10:2

[6] Cheney, J.M. and Allen, G.T.:Parasitism in Llamas. The Veterinary Clinics of North America Marrch 1989 5:1

[7] Cheney, J.M. and Allen, G.T. Parasitism in Llamas. The Veterinary Clinics of North America March 1989 5:1

[8] Johnson, LW: An Orientation to Llama Medicine or What Every Veterinarian Has Always Wanted to Know About Llamas but Was Afraid to Ask, Llama Medicine Workshop for Veterinarians 1993.

[9] Johnson, LW: An Orientation to Llama Medicine or What Every Veterinarian Has Always Wanted to Know About Llamas but Was Afraid to Ask, Llama Medicine Workshop for Veterinarians 1993.