HABRONEMATIDIOSIS // HABRONEMA WORMS

There are two main genus that are habronema and Draschia .Members of the genus Habronema and draschia are small, slender , white translucent worm 1.5-2.5 cm long. Haabronema spp. Are located on the mucosa of the stomach, just beneath a thick layer of mucus, but Draschia megastoma is found embeded in tumor-like swelling in the fundus region of stomach wall.

The eggs of both genera are elongate thin –walled, and measures 40-50 µm by 10-16 µm , and the eggs contain a larva are passed with faeces. The larvae (or vermiform embryo) of Draschia genus hatch from tiny eggs soon after they are laid. But, the eggs that a vermiform embryo of habronema are usually passed in the faeces. So that , the eggs and L1s are passed in the faeces.

Life cycle : The life cycle is similar for all species and is indirect in both genera. The intermediate hosts are Dipteran flies as Musca, Stomaxys, Haematobia (lyperosia). The eggs or larvae are passed in the faeces and the L1 are ingested by larvael stageof various intermediate hosts that are often present in faeces. Development to L1 occurs syncronously with development to maturity of the fly intermediate hosts. This is generally in a little time than a week.
When the fly feeds around mouth, lips, ocular conjuctiva, and nostril of the horse, the larvae pass from its mouth on to the skin anda re swallowed. Sometimes infected flies may be swallowed whole in feed and drinking water.
Development to adult takes place in the stomach. The adult parasites develop in about 8 weeks.
When the larvae are deposited on a skin wound or around eyes they can invade the tissue ; they do not complete their development but may cause granulomatous skin lesions .

Pathogenesis – clinical signs : These parasites cause chronic catarhall gastritis in horses. Adult worms burrow into the submucosa of the stomach producing large tumor-like nodules, filled with a creamy pus like substance , causing the mucosa to protrude into the gastric lumen.
Mineralised granules, caseous debris and larvae may be found in the lesions. These nodules ocur in the fundus region and seem to be well tolerated unless they protrude into the lumen. Sometimes, these nodules may be infected by secondary pygenic bacteria.
The presence adult parasites in the stomach cause very little clinical disturbance. Sometimes, they cause irrequlars stomch function and they may cause perforation of the stomach wall.
Lesions of cutaneous habronematidosis are most common in areas of the body liable to in jury stage, there is intense itching of the infected wound, which cause further self-inflicted damage. Subsequenly, a reddish-brown, non-healing cauliflower- like granuloma develops that protrudes above the level of the surroding skin and may be up to 8.0 cm in diameters. These lesions are known as ***" SUMMER SORES "*** in acute caeses . later the lesions may become more chronic, fibrous and inactive, but will not heal until the advent of cooler weather when fly activity cases.
Clinical incidence is seasonal .
Sometimes, invasion of the eyes produces a persistant conjuctivitis with nodular ulcers.

In rarely, the larva are found around mouth and nose may arrive the lungs via upper respiratory way.

Diagnosis : larvated eggs or larva emay be recoverred on standart faecal flotation . Eggs of both genera are elongate, thin walled, and often contain first stage larva. The larvae are recognised by spiny knobs on their tail.
But, gastric infection is not easily diagnosis since the eggs and larvae are not readily demonstrable in the faeces by routine techniques.
Diagnosis of cutaneous habronematidosis is based on clinical signs, fly season and skin biopsie.

Treatment : ivermectin and moxidectin are treatment choice for adult worms. Ivermectin is approved for treatment of summer sores caused by larvae of Habronema and Draschia species .

SETARIOSIS

Setaria nematodes are usually harmless inhabitants of the peritoneal and pleural cavities.
The parsites are selenderwhitish worms, up to 15 cm long, and the posterior end is spiraly coiled. The mouth is surrounded by a cuticular ring and two pairs of cuticular protrusions are found in this area. These structures given the worms a characteristic apperance.
Adult parasites are located peritoneal and pleural cavities. Microfilariae are found in blood vessels and this microfilariae are
Sheathed and measure 190-260 µm.

Species	Hosts	site	intermediate hosts
S.equina	horse, donkey, other Equids	pleural , peritoneal cavities	mosquitoes
S.labiato-papillosa (S. digitata)	ruminants	pleural, peritoneal cavities	mosquitoes

Life cycle : life cycle is indirect and mosquitoes are intermediate hosts. Microfilariae are found in blood vwssels. Larvae are taken up by mosquitoes, including Aedes and Culex species. Infective larvae develop in the mosquitoes muscles in 12-16 days, anda re reinjected into final hosts when the mosquitoes feed.
Prepatent period is about 8-10 months.
Prenatal transmission is found rarely in S . labiato-papillosa .

Pathogenesis and clinical signs : The worms in their normal site are usually harmless.
S.labiato-papillosa causes a mild peritonitis and is only discovered at necropsy. This species may have an erratic migration in sheep, goats and horses and enters the spinal canal causing ***cerebrospinal setariosis (cerebrospinal nematodiosis – lumbar paralysis)*** This pathological situation is irresersible and often fatal.

Young and adult parasites may cause pathological changes in pericard and epicard tissues. Setaria equina may be cause peritonitis in horses. Migration larvae of S. equina can cause an encephalomyelitis in horses and can also invade the eyes and induce blindness in horses, when the nervous tissue is involved by S. equina. There is locomotor disturbance and in severe cases lumbar paralysis.

Diagnosis : infection with the adult parasites is only accidentally discovered in the living animal by finding of microfilariae in routine blood smears. Adult parasites may be found in necropsy in cavities.
In addition, ELISA and PCR methods sre used in diagnosis

Treatment : Ivermectin may be effect against adult parasites, but there is no treatment for seterial paralysis.

PARAFILARIOSIS --- SUMMER BLEEDING

Parafilaria worms live under the skin where they produce inflammatory lesions or nodules.

Species	Hosts	site	intermediate hosts
Parafilaria bovicola	ruminants	subcutaneous, intermuscular tissues	Muscid files
P.multipapillosa	horse,donkey	subcutaneous, intermuscular tissue	horn flies, haematobia spp.

These worms are slender and white colour, and about 3.0-7.0 cm in length. There numerious papillae and circular ridges in the cuticle in anterior end of body.

Eggs od P. Bovicola is small and embryonated, 45 by 30 µm, that has a thin flexible shell.
Eggs are laid on the skin surface where they hatch to release the microfilaria or L1, which are about 200 µm in length.

Life cycle : eggs or free L1 present in exudates from bleeding points in the skin surface are ingested by intermediate hosts. The larvae develop to L3 within several weeks to months, depending on air temperature. Tramsmission occurs when infected intermediate hosts feed on lacrimal secretions or skin wounds in cattle and horses. The L3s deposited then migrate in the subcutaneous tissue and develop to the adult stage under the skin 7-12 months.

Pathogenesis and clinical signs :

1 . P. bovicola : adult worms in subcutaneous tissue induce small inflammatory lesions and haemorrhagic nodules that are seen usually in the upper body region. These nodules are predominantly on the shoulders, rump, back and waist region in infected ruminants, and the nodules are up to 15cm in diameter.
The filaria find into these nodules, and these nodules are painless. In the time, the haemorrhagic exudate leaks from a small opening that develop on surface of nodules.
The eggs and larvae are found in leaking exudate. Because of this clinical apperance, the disease is called " ***SUMMER BLEEDİNG "*** .
This exudate continues during 1-2 days, and then, these lesions regress, but a few days later, these nodules are happened an other area on body.
The affected areas have to be trimmed at marketing and economic loss is happened in meat and leather production.

2 . P. multipapillosa . the formation and course of disease are resemble bovine " summer bleeding " disease. The nodules are usually seen in harness area in horses, that's way, the infected horses are unsuitable working.
The nodules are occured usually from June to August period, are 1-5 cm in diameters.
A hole is found in middle area od nodules, haemorrhagic exduate leaks from this hole.
Eggs and larvae are found in haemorrhagic exudate.
The lesions are often occured in hot weather conditions after rainy season.
Active bleeding occurs only during daylight hours, especially when horses are exposed to direct sunrise.
Bleeding in affected horse would immediately stop the horses are brought into the stable or dark area.
But, if these horses are went back in sunlight area teh bleeding starts again.
The disease does not ocur in cool weather condition or winter season.
There are hairless and depigmented areas are found in old nodules. The resitance for reinfection develops in horses at the age of 4 years and above.

Diagnosis : the presence of nodules in the skin " bleeding points " are typical. Larvated eggs and microfilaria can be demostrated by microscopic examinationof smears taken from the haemorrhagic exudate of fresh lesions.
A few ml of 3 % aceic acid are dropped onto the exudate sample

Treatment : the bovine " summer bleeding " disease is cured by ivermectin, moxidectin and nitroxynil

Ivermectin (0.2 mg/kg, paste formulation is used for treatment in horses.

SPIROCERCOSIS // SPIROCERCA LUPI INFECTION

Spirocerca lupi, the esohageal worm, is a nematode usually associated with the formation of nodules in the esophageal wall of dogs and cats.

They are solid, reddish, spirally-coiled, usually 3-3 cm long anda are found tumour like granuloma in the wall of esophagus and stomach. Coprophagous beetles are intermediate hosts. The eggs are very small, smooth thick wall anda re elongate with paralel side walls. The eggs have a larva when they pass in faeces , and their measures are 30-37 by 11-15 µm.

The life cycle : The life cycle is indirect, and various coprophagous beetles are intermediated hosts and rodents, some birds and lizards are paratenic hosts.
The eggs that have L1 reach from esophagus to intestine, and these eggs excrete with feaces of final hosts. Excretion of eggs is taken place rarely with vomitus.
Infected form is L3 for final hosts.
Development from L1 to L3 is happened about 2 months in intermediated hosts. If a paratenic host eats a intermediated hosts harbouring L3 this infected stage larva is enclosed in a cyst in paratenic hosts and these L3s pass from a paratenic host to an other paratenic host.
Infection of the final hosts is happened by ingestation intermediated hosts or paratenic hosts that have L3. After infection of final hosts , L3s reach into the stomach, and then , L3s migrate from stomach to thoraxic aorta via blood vessels within 24-48 hours. The development of L4s is happened about 3 months in aorta. And then, the larvae migrate to esophagus and the nodules that have numerous parasites are developed in esophagus submucosal tissue within about 3- 7 months after infection . The female parasites pierce at nodule, the eggs are excreted by this hole.
Prepatent period is 5-6 months.

Pathogenesis and clinical signs : The nodules by haemorrhagic structure containing with larvae too adult parasites are happened in various organs but especially in aorta.
Siporacerca lupi causes vertebral thorax spondylitis and this pathological situation is unchange .
An other important pathogenesis is esophageal sarcoma and it is evident in dogs.
The disease may follow subclinic course. But vomitus, difficult swalling and loss weight are happened as a result of nodule development. Therse is shorthess of breath in infected disease animals, and the animals sit with their head extended. Aortic rupture may rare but occurs .

Diagnosis :
1 . faecal examination : the high density solutions (33 % ZnSo4 or solution of D : 1.96 sodium nitrat) are used for faecal examination
2) pathological finfings : nodules in aorta, esophagus, stomach in necropsy
3) radiography : radiograhpyis is most important method in diagnosis

Treatment :

1. doramectin , 0.4 mg/kg (s.c) six doses at 2 weeks intervals
2. milbeycine oxime, 0.5 mg / kg (p.o) is used in 0 ,7 , 28 days, and then monthly for at least 2 months
3. 2.5 % moxidectin / 10 % imidacloprid (2.5 / 10 mg/kg, respectively, topical,) weekly for at least 12 weeks
4. for all treatments protocal, endoscopy and /or radiograhpy should be used toevaluate treatment efficacy
5. surgical removal usually is unsuccesful because of the large areas of the esophagus area
6. in generally treatment is more effective if disease is diagnose early
7. for dogs with Sprocerca-induced sarcomas surgery is recommented